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H I S T O R Y

OF THE

E A R T H,

AND

ANIMATED NATURE.

By OLIVER GOLDSMITH.

IN EIGHT VOLUMES.

THE SECOND EDITION.

V O L. VI.

L O N D O N,

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CONTINUATION OF PART V.

O F
BIRDS OF THE CRANE KIND.

C H A P. VI.

Of the Bittern or Mire-drum.

THOSE who have walked in an evening by the sedgy sides of unfrequented rivers, must remember a variety of notes from different water-fowl: the loud scream of the wild goose, the croaking of the mallard, the whining of the lapwing, and the tremulous neighing of the jack snipe. But of all those sounds, there is

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none so dismally hollow as the booming of the bittern. It is impossible for words to give those who have not heard this evening-call an adequate idea of its solemnity. It is like the interrupted bellowing of a bull, but hollower and louder, and is heard at a mile's distance, as if issuing from some formidable being that resided at the bottom of the waters.

The bird, however, that produces this terrifying sound is not so big as an heron, with a weaker bill, and not above four inches long. It differs from the heron chiefly in its colour, which is in general of a paleish yellow, spotted and barred with black. Its wind-pipe is fitted to produce the sound for which it is remarkable; the lower part of it dividing into the lungs is supplied with a thin loose membrane, that can be filled with a large body of air, and exploded at pleasure. These bellowing explosions are chiefly heard from the beginning of spring to the end of autumn; and, however awful they may seem to us, are the calls to courtship, or of connubial felicity.

From the loudness and solemnity of the note, many have been led to suppose, that the bird made use of external instruments to produce it, and that so small a body could never eject such a quantity of tone. The common people are of opinion, that it thrusts its bill into a reed



that serves as a pipe for swelling the note above its natural pitch; while others, and in this number we find Thomson the poet, imagine that the bittern puts its head under water, and then violently blowing produces its boomings. The fact is, that the bird is sufficiently provided by nature for this call; and it is often heard where there are neither reeds nor waters to assist its sonorous invitations.

It hides in the sedges by day, and begins its call in the evening, booming six or eight times, and then discontinuing for ten or twenty minutes to renew the same sound. This is a call it never gives but when undisturbed and at liberty. When its retreats among the sedges are invaded, when it dreads or expects the approach of an enemy, it is then perfectly silent. This call it has never been heard to utter when taken or brought up in domestic captivity; it continues under the controul of man a mute forlorn bird, equally incapable of attachment or instruction. But, though its boomings are always performed in solitude, it has a scream which is generally heard upon the seizing its prey, and which is sometimes extorted by fear.

This bird, though of the heron kind, is yet neither so destructive nor so voracious. It is a retired, timorous animal, concealing itself

in the midst of reeds and marshy places, and living upon frogs, insects, and vegetables; and though so nearly resembling the heron in figure, yet differing much in manners and appetites. As the heron builds on the tops of the highest trees, the bittern lays its nest in a sedgy margin, or amidst a tuft of rushes. The heron builds with sticks and wool; the bittern composes its simpler habitation of sedges, the leaves of water-plants, and dry rushes. The heron lays four eggs; the bittern generally seven or eight, of an ash-green colour. The heron feeds its young for many days; the bittern in three days leads its little ones to their food. In short, the heron is lean and cadaverous, subsisting chiefly upon animal food; the bittern is plump and fleshy, as it feeds upon vegetables when more nourishing food is wanting.

It cannot be, therefore, from its voracious appetites, but its hollow boom, that the bittern is held in such detestation by the vulgar. I remember in the place where I was a boy with what terror this bird's note affected the whole village; they considered it as the presage of some sad event; and generally found or made one to succeed it. I do not speak ludicrously; but if any person in the neighbourhood died, they supposed it could not be otherwise, for the

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night-raven had foretold it ; but if nobody happened to die, the death of a cow or a sheep gave completion to the prophecy.

Whatever terror it may inspire among the simple, its flesh is greatly in esteem among the luxurious. For this reason, it is as eagerly sought after by the fowler as it is shunned by the peasant ; and as it is a heavy-rising, slow-winged bird, it does not often escape him. Indeed, it seldom rises but when almost trod upon ; and seems to seek protection rather from concealment than flight. At the latter end of autumn, however, in the evening, its wonted indolence appears to forsake it. It is then seen rising in a spiral ascent till it is quite lost from the view, making at the same time a singular noise very different from its former boomings. Thus the same animal is often seen to assume different desires ; and while the Latins have given the bittern the name of the star-reaching bird (or the *stellaris*) the Greeks, taking its character from its more constant habits, have given it the title of the *ονυξ*, or the lazy.

C H A P. VII.

Of the Spoonbill or Shoveler.

AS we proceed in our description of the crane kind, birds of peculiar forms offer, not entirely like the crane, and yet not so far different as to rank more properly with any other class. Where the long neck and stilt-like legs of the crane are found, they make too striking a resemblance, not to admit such birds of the number; and though the bill or even the toes should entirely differ, yet the outlines of the figure, and the natural habits and dispositions being the same, these are sufficient to mark their place in the general groupe of nature.

The Spoonbill is one of those birds which differs a good deal from the crane, yet approaches this class more than any other. The body is more bulky for its height, and the bill is very differently formed from that of any other bird whatever. Yet still it is a comparatively tall bird; it feeds among waters; its toes are divided; and it seems to possess the natural dispositions of the crane. The European spoonbill is of about the bulk of a crane; but

Fig. 1



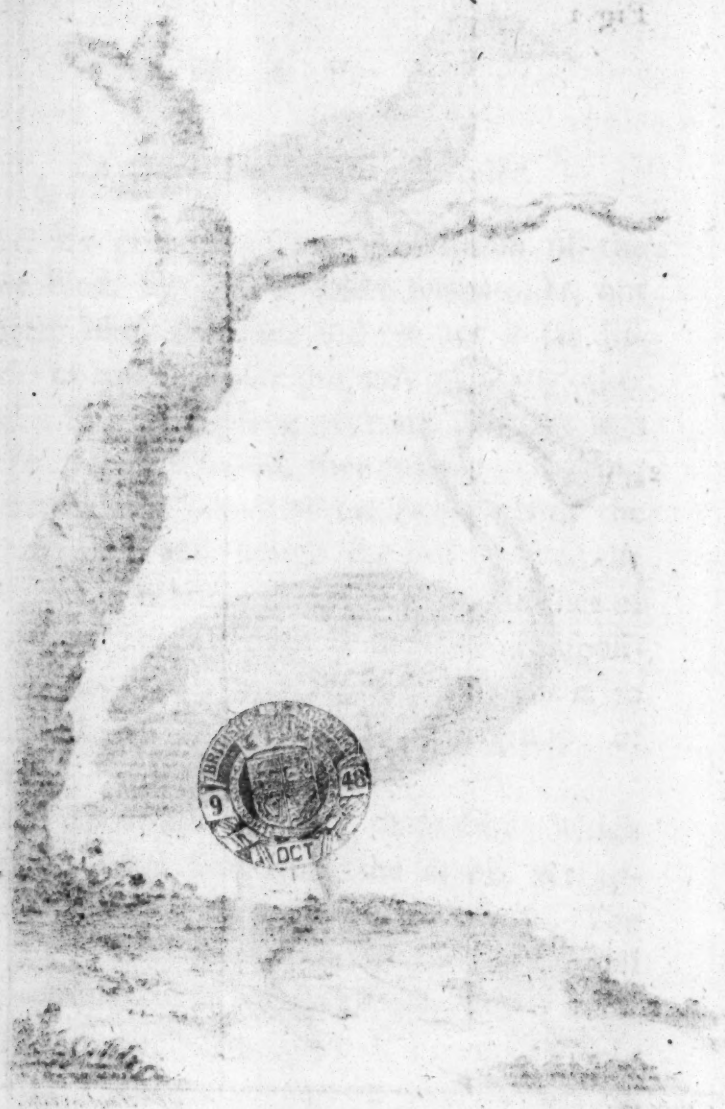
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- 1 A Species of the Calao 253
2 The Spoon bill.



1. A sketch of the 1848
The sketch of the 1848

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as the one is above four feet high, the other is not more than three feet three inches. The common colour of those of Europe, is a dirty white; but those of America are of a beautiful rose colour, or a delightful crimson. Beauty of plumage seems to be the prerogative of all the birds of that continent; and we here see the most splendid tints bestowed on a bird, whose figure is sufficient to destroy the effects of its colouring; for its bill is so oddly fashioned, and its eyes so stupidly staring, that its fine feathers only tend to add splendour to deformity. The bill, which in this bird is so very particular, is about seven inches long, and running out broad at the end, as its name justly serves to denote; it is there about an inch and a half wide. This strangely fashioned instrument, in some is black; in others of a light grey; and in those of America, it is of a red colour, like the rest of the body. All round the upper chap there runs a kind of rim, with which it covers that beneath; and as for the rest, its cheeks, and its throat, are without feathers, and covered with a black skin.

A bird so oddly fashioned, might be expected to possess some very peculiar appetites; but the spoonbill seems to lead a life entirely resembling all those of the crane kind; and Nature, when

He made the bill of this bird so very broad, seems rather to have sported with its form, than to aim at any final cause for which to adapt it. In fact, it is but a poor philosophy to ascribe every capricious variety in nature to some salutary purpose : in such solutions we only impose upon each other ; and often wilfully contradict our own belief. There must be imperfections in every being, as well as capacities of enjoyment. Between both, the animal leads a life of moderate felicity ; in part making use of its many natural advantages, and in part necessarily conforming to the imperfections of its figure.

The shoveler chiefly feeds upon frogs, toads, and serpents ; of which, particularly at the Cape of Good Hope, they destroy great numbers. The inhabitants of that country hold them in as much esteem as the ancient Egyptians did their bird ibis : the shoveler runs tamely about their houses ; and they are content with its society, as an useful though an homely companion. They are never killed ; and indeed they are good for nothing when they are dead, for the flesh is unfit to be eaten.

This bird breeds in Europe, in company with the heron, in high trees ; and in a nest formed of the same materials. Willughby tells us, that in a certain grove, at a village

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called Seven Huys, near Leyden, they build and breed yearly in great numbers. In this grove, also, the heron, the bittern, the cormorant, and the shag, have taken up their residence, and annually bring forth their young together. Here the crane kind seem to have formed their general rendezvous; and, as the inhabitants say, every sort of bird has its several quarter, where none but their own tribe are permitted to reside. Of this grove the peasants of the country make good profit. When the young ones are ripe, those that farm the grove, with a hook at the end of a long pole, catch hold of the bough on which the nest is built, and shake out the young ones; but sometimes the nest and all tumble down together.

The shoveler lays from three to five eggs; white, and powdered with a few sanguine or pale spots. We sometimes see, in the cabinets of the curious, the bills of American shovelers, twice as big and as long as those of the common kind among us; but these birds have not yet made their way into Europe.

C H A P. VIII.

The Flamingo.

THE Flamingo has the justest right to be placed among cranes; and though it happens to be web-footed, like birds of the goose kind, yet its height, figure, and appetites entirely remove it from that groveling class of animals. With a longer neck and legs than any other of the crane kind, it seeks its food by wading among waters; and only differs from all of this tribe in the manner of seizing its prey; for as the heron makes use of its claws, the flamingo uses only its bill, which is strong and thick for the purpose, the claws being useless, as they are feeble, and webbed like those of water-fowl.

The flamingo is the most remarkable of all the crane kind, the tallest, bulkiest, and the most beautiful. The body, which is of a beautiful scarlet, is no bigger than that of a swan; but its legs and neck are of such an extraordinary length, that when it stands erect, it is six feet six inches high. Its wings, extended, are five feet six inches from tip to tip; and it is four feet eight inches from tip to tail. The



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1. Flamingo, 2. Avosetta.



San Francisco, Cal. 9/20/11

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head is round and small, with a large bill, seven inches long, partly red, partly black, and crooked like a bow. The legs and thighs, which are not much thicker than a man's finger, are about two feet eight inches high; and its neck near three feet long. The feet are not furnished with sharp claws, as in others of the crane kind; but feeble, and united by membranes, as in those of the goose. Of what use these membranes are, does not appear, as the bird is never seen swimming, its legs and thighs being sufficient for bearing it into those depths where it seeks for prey.

This extraordinary bird is now chiefly found in America, but was once known on all the coasts of Europe. Its beauty, its size, and the peculiar delicacy of its flesh, have been such temptations to destroy or take it, that it has long since deserted the shores frequented by man, and taken refuge in countries that are as yet but thinly peopled. In those desert regions, the flamingos live in a state of society, and under a better polity than any other of the feathered creation.

When the Europeans first came to America, and coasted down along the African shores, they found the flamingos on several shores on either continent, gentle, and no way distrustful

of mankind *. They had long been used to security, in the extensive solitudes they had chosen; and knew no enemies, but those they could very well evade or oppose. The Negroes and the native Americans were possessed but of few destructive arts for killing them at a distance; and when the bird perceived the arrow, it well knew how to avoid it. But it was otherwise when the Europeans first came among them: the sailors, not considering that the dread of fire-arms was totally unknown in that part of the world, gave the flamingo the character of a foolish bird, that suffered itself to be approached and shot at. When the fowler had killed one, the rest of the flock, far from attempting to fly, only regarded the fall of their companion in a kind of fixed astonishment: another and another shot was discharged; and thus the fowler often levelled the whole flock, before one of them began to think of escaping.

But at present it is very different in that part of the world; and the flamingo is not only one of the scarcest but of the shyest birds in the world, and the most difficult of approach. They chiefly keep near the most deserted and inhospitable shores; near salt-water lakes and

* Albin's New History of Birds.

swampy islands. They come down to the banks of rivers by day; and often retire to the inland, mountainous parts of the country at the approach of night. When seen by mariners in the day, they always appear drawn up in a long close line of two or three hundred together; and, as Dampier tells us, present, at the distance of half a mile, the exact representation of a long brick wall. Their rank, however, is broken when they seek for food; but they always appoint one of the number as a watch, whose only employment is to observe and give notice of danger, while the rest are feeding. As soon as this trusty centinel perceives the remotest appearance of danger, he gives a loud scream, with a voice as shrill as a trumpet, and instantly the whole cohort are upon the wing. They feed in silence; but, upon this occasion, all the flock are in one chorus, and fill the air with intolerable screamings.

From this it appears that the flamingos are very difficult to be approached at present, and that they avoid mankind with the most cautious timidity; however, it is not from any antipathy to man that they shun his society, for in some villages, as we are assured by Labat, along the coast of Africa, the flamingos come

in great numbers to make their residence among the natives. There they assemble by thousands, perched on the trees, within and about the village ; and are so very clamorous, that the sound is heard at near a mile distance. The Negroes are fond of their company ; and consider their society as a gift of Heaven, as a protection from accidental evils. The French, who are admitted to this part of the coast, cannot, without some degree of discontent, see such a quantity of game untouched, and rendered useless by the superstition of the natives : they now and then privately shoot some of them, when at a convenient distance from the village, and hide them in the long grass, if they perceive any of the Negroes approaching ; for they would probably stand a chance of being ill treated, if the blacks discovered their sacred birds were thus unmercifully treated.

Sometimes, in their wild state, they are shot by mariners ; and their young, which run excessively fast, are often taken. Labat has frequently taken them with nets, properly extended round the places they breed in. When their long legs are entangled in the meshes, they are then unqualified to make their escape : but they still continue to combat with their destroyer ; and the old ones, though seized by

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the head, will scratch with their claws; and these, though seemingly inoffensive, very often do mischief. When they are fairly disengaged from the net, they nevertheless preserve their natural ferocity; they refuse all nourishment; they peck and combat with their claws at every opportunity. The fowler is therefore under a necessity of destroying them, when taken; as they would only pine and die, if left to themselves in captivity. The flesh of the old ones is black and hard; though, Dampier says, well tasted: that of the young ones is still better. But, of all other delicacies, the flamingo's tongue is the most celebrated. A dish of flamingos' tongues, says our author, is a feast for an emperor. In fact, the Roman emperors considered them as the highest luxury; and we have an account of one of them, who procured fifteen hundred flamingos' tongues to be served up in a single dish. The tongue of this bird, which is so much sought after, is a good deal larger than that of any other bird whatever. The bill of the flamingo is like a large black box, of an irregular figure, and filled with a tongue which is black and gristly; but what peculiar flavour it may possess, I leave to be determined by such as understand good eating better than I do. It is probable, that the

beauty and scarcity of the bird, might be the first inducements to studious gluttony to fix upon its tongue as meat for the table. What Dampier says of the goodness of its flesh, cannot so well be relied on; for Dampier was often hungry, and thought any thing good that could be eaten: he avers, indeed, with Labat, that the flesh is black, tough, and fishy; so that we can hardly give him credit, when he asserts, that its flesh can be formed into a luxurious entertainment.

These birds, as was said, always go in flocks together; and they move in rank, in the manner of cranes. They are sometimes seen, at the break of day, flying down in great numbers from the mountains; and conducting each other with a trumpet cry, that sounds like the word Tococo, from whence the savages of Canada have given them the name. In their flight they appear to great advantage; for they then seem of as bright a red as a burning coal. When they dispose themselves to feed, their cry ceases; and then they disperse over a whole marsh, in silence and assiduity. Their manner of feeding is very singular: the bird thrusts down its head, so that the upper convex side of the bill shall only touch the ground; and in this position the animal appears, as it were, standing upon
its

its head. In this manner it paddles and moves the bill about, and seizes whatever fish or insect happens to offer. For this purpose the upper chap is notched at the edges, so as to hold its prey with the greater security. Catesby, however, gives a different account of their feeding. According to him, they thus place the upper chap undermost, and so work about, in order to pick up a seed from the bottom of the water, that resembles millet : but as in picking up this, they necessarily also suck in a great quantity of mud, their bill is toothed at the edges, in such a manner as to let out the mud, while they swallow the grain.

Their time of breeding is according to the climate in which they reside : in North America they breed in our summer ; on the other side the line they take the most favourable season of the year. They build their nests in extensive marshes, and where they are in no danger of a surprize. The nest is not less curious than the animal that builds it : it is raised from the surface of the pool about a foot and a half, formed of mud, scraped up together, and hardened by the sun, or the heat of the bird's body : it resembles a truncated cone, or one of the pots which we see placed on chimnies ; on the top it

is hollowed out to the shape of the bird, and in that cavity the female lays her eggs, without any lining but the well cemented mud that forms the sides of the building. She always lays two eggs, and no more; and, as her legs are immoderately long, she straddles on the nest, while her legs hang down, one on each side, into the water.

The young ones are a long while before they are able to fly; but they run with amazing swiftness. They are sometimes caught; and, very different from the old ones, suffer themselves to be carried home, and are tamed very easily. In five or six days they become familiar, eat out of the hand, and drink a surprizing quantity of sea-water. But though they are easily rendered domestic, they are not reared without the greatest difficulty; for they generally pine away, for want of their natural supplies, and die in a short time. While they are yet young, their colours are very different from those lively tints they acquire with age. In their first year they are covered with plumage of a white colour, mixed with grey; in the second year the whole body is white, with here and there a slight tint of scarlet; and the great covert feathers of the wings are black: the third year the bird acquires all its beauty; the

plumage of the whole body is scarlet, except some of the feathers in the wings, that still retain their sable hue. Of these beautiful plumes, the savages make various ornaments; and the bird is sometimes skinned by the Europeans, to make muffs. But these have diminished in her price, since we have obtained the art of dying feathers of the brightest scarlet.

C H A P. IX.

Of the Avosetta or Scooper, and the Corrià or Runner.

THE extraordinary shape of the Avosetta's bill might incline us to wish for its history; and yet in that we are not able to indulge the reader. Natural historians have hitherto, like ambitious monarchs, shewn a greater fondness for extending their dominions than cultivating what they possess. While they have been labouring to add new varieties to their catalogues, they have neglected to study the history of animals already known.

The Avosetta is chiefly found in Italy, and now and then comes over into England. It is

about the size of a pigeon, is a pretty upright bird, and has extremely long legs for its size. But the most extraordinary part of its figure, and that by which it may be distinguished from all others of the feathered tribe, is the bill, which turns up like a hook, in an opposite direction to that of the hawk or the parrot. This extraordinary bill is black, flat, sharp and flexible at the end, and about three inches and a half long. From its being bare a long way above the knee, it appears, that it lives and wades in the waters. It has a chirping, pert note, as are told; but with its other habits we are entirely unacquainted. I have placed it, from its slender figure, among the cranes; although it is web-footed, like the duck. It is one of those birds of whose history we are yet in expectation.

To this bird of the crane kind, so little known, I will add another, still less known; the Corriera or Runner, of Aldrovandus. All we are told of it is, that it has the longest legs of all web-footed fowls, except the flamingo and avosetta; that the bill is straight, yellow and black at the ends; that the pupils of the eyes are surrounded with two circles, one of which is bay, and the other white; below, near the belly, it is whitish; the tail, with two white

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feathers, black at the extremities ; and that the upper part of the body is of the colour of rusty iron. It is thus that we are obliged to substitute dry description for instructive history ; and employ words, to express those shadings of colour which the pencil alone can convey.

C H A P. X.

Of Small Birds of the Crane Kind, with the Thighs partly bare of Feathers.

AS I have taken my distinctions rather from the general form and manners of birds, than from their minuter though perhaps more precise discriminations, it will not be expected that I should here enter into a particular history of a numerous tribe of birds, whose manners and forms are so very much alike. Of many of them we have scarce any account in our historians, but tedious descriptions of their dimensions, and the colour of their plumage ; and of the rest, the history of one is so much that of all, that it is but the same account repeated to a most disgusting reiteration. I will therefore groupe them into one general draught ; in

which the more eminent, or the most whimsical, will naturally stand forward on the canvas.

In this groupe we find an extensive tribe of native birds, with their varieties and affinities; and we might add an hundred others, of distant climates, of which we know little more than the colour and the name. In this list is exhibited the Curlew, a bird of about the size of a duck, with a bill four inches long: the Woodcock, about the size of a pigeon, with a bill three inches long: the Godwit, of the same size; the bill four inches: the Green Shank, longer legged; the bill two inches and an half: the Red Shank, differing in the colour of its feet from the former: the Snipe, less by half, with a bill three inches. Then with shorter bills—The Ruff, with a collar of feathers round the neck of the male; the Knot, the Sandpiper, the Sanderling, the Dunlin, the Purre, and the Stint. To conclude; with bills very short—The Lapwing, the Green Plover, the Grey Plover, the Dottrel, the Turnstone and the Sea-lark. These, with their affinities, are properly natives or visitants of this country: and are dispersed along our shores, rivers, and watery grounds. Taking in the birds of this kind, belonging to other countries, the list would be very widely extended; and the whole

of this class, as described by Brisson, would amount to near an hundred.

All these birds possess many marks in common; though some have peculiarities that deserve regard. All these birds are bare of feathers above the knee, or above the heel, as some naturalists chuse to express it. In fact, that part which I call the knee, if compared with the legs of mankind, is analogous to the heel; but, as it is commonly conceive otherwise, I have conformed to the general apprehension. I say, therefore, that all these birds are bare of feathers above the knee; and in some they are wanting half way up the thigh. The nudity in that part, is partly natural, and partly produced by all birds of this kind habitually wading in water. The older the birds the barer are its thighs; yet even the young ones have not the same downy covering reaching so low as the birds of any other class. Such a covering there would rather be prejudicial, as being continually liable to get wet in the water.

As these birds are usually employed rather in running than in flying, and as their food lies entirely upon the ground, and not on trees, or in the air, so they run with great swiftness for their size, and the length of their legs assists their velocity. But as, in seeking

their food, they are often obliged to change their station; so also are they equally swift of wing, and traverse immense tracts of country without much fatigue.

It has been thought by some, that a part of this class lived upon an oily slime, found in the bottoms of ditches and of weedy pools; they were thence termed, by Willughby, *Mud-suckers*. But later discoveries have shewn that, in these places, they hunt for the caterpillars and worms of insects. From hence, therefore, we may generally assert, that all birds of this class live upon animals of one kind or another. The long-billed birds suck up worms and insects from the bottom; those furnished with shorter bills, pick up such insects as lie nearer the surface of the meadow, or among the sands on the sea-shore.

Thus the curlew, the woodcock, and the snipe, are ever seen in plashy brakes, and under covered hedges, assiduously employed in seeking out insects in their worm state; and it seems, from their fatness, that they find a plentiful supply. Nature, indeed, has furnished them with very convenient instruments for procuring their food. Their bills are made sufficiently long for searching; but still more, they are endowed with an exquisite sensibility

at the point, for feeling their provision. They are furnished with no less than three pair of nerves, equal almost to the optic nerves in thickness; which pass from the roof of the mouth, and run along the upper chap to the point.

Nor are those birds with shorter bills, and destitute of such convenient instruments, without a proper provision made for their subsistence. The lapwing, the sand-piper, and the red-shank, run with surprizing rapidity along the surface of the marsh, or the sea-shore, quarter their ground with great dexterity, and leave nothing of the insect kind that happens to lie on the surface. These, however, are neither so fat nor so delicate as the former; as they are obliged to toil more for a subsistence, they are easily satisfied with whatever offers; and their flesh often contracts a relish from what has been their latest, or their principal, food.

Most of the birds formerly described, have stated seasons for feeding and rest: the eagle kind prowl by day, and at evening repose; the owl by night, and keeps unseen in the day-time. But these birds, of the crane kind, seem at all hours employed: they are seldom at rest by day; and, during the whole night season, every meadow and marsh resounds with their different calls, to courtship or to food.

This seems to be the time when they least fear interruption from man; and though they fly at all times, yet, at this season, they appear more assiduously employed, both in providing for their present support, and continuing that of posterity. This is usually the season when the insidious fowler steals in upon their occupations, and fills the whole meadow with terror and destruction.

As all of this kind live entirely in waters, and among watery places, they seem provided by nature with a warmth of constitution to fit them for that cold element. They reside, by choice, in the coldest climates; and as other birds migrate here in our summer, their migrations hither are mostly in the winter. Even those that reside among us the whole season, retire in summer to the tops of our bleakest mountains; where they breed, and bring down their young, when the cold weather sets in.

Most of them, however, migrate, and retire to the polar regions; as those that remain behind in the mountains, and keep with us during summer bear no proportion to the quantity which in winter haunt our marshes and low grounds. The snipe sometimes builds here; and the nest of the curlew is sometimes found

in the plasheſ of our hills : but the number of theſe is very ſmall ; and it is moſt probable that they are only ſome ſtragglers, who, not having ſtrength or courage ſufficient for the general voyage, take up from neceſſity their habitation here.

In general, during ſummer, this whole claſs either chuſe the coldeſt countries to retire to, or the coldeſt and the moiſteſt part of ours to breed in. The curlew, the woodcock, the ſnipe, the godwit, the grey plover, the green, and the long-legged plover, the knot and the turnſtone, are rather the gueſts than the natives of this iſland. They viſit us in the beginning of winter, and forſake us in the ſpring. They then retire to the mountains of Sweden, Poland, Pruffia, and Lapland, to breed. Our country, during the ſummer ſeaſon, becomes uninhabitable to them. The ground parched up by the heat ; the ſprings dried away ; and the vermicular inſects already upon the wing ; they have no means of ſubſiſting. Their weak and delicately pointed bills are unfit to dig into a reſiſting ſoil ; and their prey is departed, though they were able to reach its retreats. Thus, that ſeaſon when nature is ſaid to teem with life, and to put on her gayeſt liveries, is to them an interval of ſterility and famine.

The coldest mountains of the north are then a preferable habitation; the marshes there are never totally dried up; and the insects are in such abundance, that, both above ground and underneath, the country swarms with them. In such retreats, therefore, these birds would continue always; but that the frosts, when they set in, have the same effect upon the face of the landscape, as the heats of summer. Every brook is stiffened into ice; all the earth is congealed into one solid mass; and the birds are obliged to forsake a region where they can no longer find subsistence.

Such are our visitants. With regard to those which keep with us continually, and breed here, they are neither so delicate in their food, nor perhaps so warm in their constitutions. The lapwing, the ruff, the red-frank, the sand-piper, the sea-pie, the Norfolk plover, and the sea-lark, breed in this country, and, for the most part, reside here. In summer they frequent such marshes as are not dried up in any part of the year; the Essex hundreds, and the fens of Lincolnshire. There, in solitudes formed by surrounding marshes, they breed and bring up their young. In winter they come down from their retreats, rendered uninhabitable by the flooding of the

waters; and seek their food about our ditches and marshy meadow-grounds. Yet even of this class, all are wanderers upon some occasions; and take wing to the northern climates, to breed and find subsistence. This happens when our summers are peculiarly dry; and when the fenny countries are not sufficiently watered to defend their retreats.

But though this be the usual course of nature, with respect to these birds, they often break through the general habits of their kind; and as the lapwing, the ruff, and the sand-piper, are sometimes seen to alter their manners, and to migrate from hence, instead of continuing to breed here; so we often find the wood-cock, the snipe, and the curlew, reside with us during the whole season, and breed their young in different parts of the country. In Casewood, about two miles from Tunbridge, as Mr. Pennant assures us, some woodcocks are seen to breed annually. The young have been shot there in the beginning of August; and were as healthy and vigorous as they are with us in winter, though not so well tasted. On the Alps, and other high mountains, says Willughby, the woodcock continues all summer. I myself have flushed them on the top of Mount Jura, in June and July. The eggs are long,

of a pale red colour, and stained with deeper spots and clouds. The nests of the curlew and the snipe are frequently found; and some of these perhaps never entirely leave this island.

It is thus that the same habits are in some measure common to all; but in nestling, and bringing up their young, one method takes place universally. As they all run and feed upon the ground, so they are all found to nestle there. The number of eggs generally to be seen in every nest, is from two to four; never under, and very seldom exceeding. The nest is made without any art; but the eggs are either laid in some little depression of the earth, or on a few bents and long grass, that scarcely preserve them from the moisture below. Yet such is the heat of the body of these birds, that their time of incubation is shorter than with any others of the same size. The magpie, for instance, takes twenty-one days to hatch its young; the lapwing takes but fourteen. Whether the animal oil, with which these birds abound, gives them this superior warmth, I cannot tell; but there is no doubt of their quick incubation.

In their seasons of courtship, they pair as other birds; but not without violent contests between the males, for their choice of the female. The lapwing and the plover are often

seen to fight among themselves; but there is one little bird of this tribe, called the ruff, that has got the epithet of the fighter, merely from its great perseverance and animosity on these occasions. In the beginning of spring, when these birds arrive among our marshes, they are observed to engage with desperate fury against each other; it is then that the fowlers, seeing them intent on mutual destruction spread their nets over them, and take them in great numbers. Yet even in captivity their animosity still continues: the people that fat them up for sale, are obliged to shut them up in close dark rooms; for if they let ever so little light in among them, the turbulent prisoners instantly fall to fighting with each other, and never cease till each has killed its antagonist, especially, says Willughby, if any body stands by. A similar animosity, though in less degree, prompts all this tribe; but when they have paired, and begun to lay, their contentions are then over.

The place these birds chiefly chuse to breed in, is in some island surrounded with sedgey moors, where men seldom resort; and in such situations I have often seen the ground so strewn with eggs and nests, that one could scarce take a step without treading upon some of them. As soon as a stranger intrudes upon

these retreats, the whole colony is up, and an hundred different screams are heard from every quarter. The arts of the lapwing to allure men or dogs from her nest, are perfectly amusing. When she perceives the enemy approaching, she never waits till they arrive at her nest, but boldly runs to meet them: when she has come as near them as she dares to venture, she then rises with a loud screaming before them, seeming as if she were just flushed from hatching; while she is then probably a hundred yards from the nest. Thus she flies, with great clamour and anxiety, whining and screaming round the invaders, striking at them with her wings, and fluttering as if she were wounded. To add to the deceit, she appears still more clamorous, as more remote from the nest. If she sees them very near, she then seems to be quite unconcerned, and her cries cease, while her terrors are really augmenting. If there be dogs, she flies heavily at a little distance before them, as if maimed; still vociferous and still bold, but never offering to move towards the quarter where her treasure is deposited. The dog pursues, in hopes every moment of seizing the parent, and by this means actually loses the young; for the cunning bird, when she has thus drawn him off to a proper distance, then puts forth her powers, and leaves her astonished pursuer to gaze

gaze at the rapidity of her flight. The eggs of all these birds are highly valued by the luxurious; they are boiled hard, and thus served up, without any further preparation.

As the young of this class are soon hatched, so, when excluded, they quickly arrive at maturity. They run about after the mother as soon as they leave the egg; and being covered with a thick down, want very little of that clutching which all birds of the poultry kind, that follow the mother, indispensably require. They come to their adult state long before winter; and then flock together, till the breeding season returns, which for a while dissolves their society.

As the flesh of almost all these birds is in high estimation, so many methods have been contrived for taking them. That used in taking the ruff seems to be the most advantageous; and it may not be amiss to describe it. The Ruff, which is the name of the male, the Reeve that of the female, is taken in nets about forty yards long, and seven or eight feet high. These birds are chiefly found in Lincolnshire and the Isle of Ely, where they come about the latter end of April, and disappear about Michaelmas. The male of this bird, which is known from all others of the kind by the great length of the feathers round

his neck, is yet so various in his plumage, that it is said, no two ruffs were ever seen totally of the same colour. The nets in which these are taken, are supported by sticks, at an angle of near forty-five degrees, and placed either on dry ground, or in very shallow water, not remote from reeds: among these the fowler conceals himself, till the birds, enticed by a stale or stuffed bird, come under the nets: he then, by pulling a string, lets them fall, and they are taken; as are godwits, knots and grey plover, also in the same manner. When these birds are brought from under the net, they are not killed immediately, but fattened for the table, with bread and milk, hemp-seed, and sometimes boiled wheat; but if expedition be wanted, sugar is added, which will make them a lump of fat in a fortnight's time. They are kept, as observed before, in a dark room; and judgment is required in taking the proper time for killing them, when they are at the highest pitch of fatness; for, if that is neglected, the birds are apt to fall away. They are reckoned a very great delicacy; they sell for two shillings, or half a crown a piece; and are served up to the table with the train, like woodcocks, where we will leave them.

CHAP. XI.

Of the Water-hen and the Coot.

BEFORE we enter upon water-fools, properly so called, two or three birds claim our attention, which seem to form the shade between the web-footed tribe and those of the crane kind. These partake rather of the form than the habits of the crane; and, though furnished with long legs and necks, rather swim than wade. They cannot properly be called web-footed; nor yet are they entirely destitute of membranes, which fringe their toes on each side, and adapt them for swimming. The birds in question are, the Water-hen, and the Bald Coot.

These birds have too near an affinity, not to be ranked in the same description. They are shaped entirely alike, their legs are long, and their thighs partly bare; their necks are proportionable, their wings short, their bills short and weak, their colour black, their foreheads bald and without feathers, and their habits entirely the same. These, however, naturalists have thought proper to range in different classes, from very slight distinctions in their

figure. The water-hen weighs but fifteen ounces; the coot twenty-four. The bald part of the forehead in the coot is black; in the water-hen it is of a beautiful pink colour. The toes of the water-hen are edged with a straight membrane; those of the coot have it scolloped and broader.

The differences in the figure are but slight; and those in their manner of living still less. The history of the one will serve for both. As birds of the crane kind are furnished with long wings, and easily change place, the water-hen, whose wings are short, is obliged to reside entirely near those places where her food lies: she cannot take those long journeys that most of the crane kind are seen to perform; compelled by her natural imperfections, as well perhaps as by inclination, she never leaves the side of the pond or the river in which she seeks for provision. Where the stream is selvaged with sedges, or the pond edged with shrubby trees, the water-hen is generally a resident there: she seeks her food along the grassy banks; and often along the surface of the water. With Shakspeare's Edgar, she drinks the green mantle of the standing pool; or, at least, seems to prefer those places where it is seen. Whether she makes pond-weed her food, or hunts among it

for water-insects, which are found there in great abundance, is not certain. I have seen them when pond-weed was taken out of their stomach. She builds her nest upon low trees and shrubs, of sticks and fibres, by the water side. Her eggs are sharp at one end, white, with a tincture of green spotted with red. She lays twice or thrice in a summer; her young ones swim the moment they leave the egg, pursue their parent, and imitate all her manners. She rears, in this manner, two or three broods in a season; and when the young are grown up, she drives them off to shift for themselves.

As the coot is a larger bird, it is always seen in larger streams, and more remote from mankind. The water-hen seems to prefer inhabited situations: she keeps near ponds, motes, and pools of water near gentlemen's houses; but the coot keeps in rivers, and among rushy margined lakes. It there makes a nest of such weeds as the stream supplies, and lays them among the reeds, floating on the surface, and rising and falling with the water. The reeds among which it is built keep it fast; so that it is seldom washed into the middle of the stream. But if this happens, which is sometimes the case, the bird sits in her nest, like a mariner in his boat, and steers with her legs her cargo into

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the nearest harbour : there, having attained her port, she continues to sit in great tranquility, regardless of the impetuosity of the current ; and though the water penetrates her nest, she hatches her eggs in that wet condition.

The water-hen never wanders ; but the coot sometimes swims down the current, till it even reaches the sea. In this voyage these birds encounter a thousand dangers : as they cannot fly far, they are hunted by dogs and men ; as they never leave the stream, they are attacked and destroyed by otters ; they are preyed upon by kites and falcons ; and they are taken, in still greater numbers, in weirs made for catching fish ; for these birds are led into the nets, while pursuing small fish and insects, which are their principal food. Thus animated nature affords a picture of universal invasion ! Man destroys the otter, the otter destroys the coot, the coot feeds upon fish, and fish are universally the tyrants of each other !

To these birds, with long legs and finny toes, I will add one species more, with short legs and finny toes : I mean the Grebe. The entire resemblance of this bird's appetites and manners to those of the web-footed class, might justly induce me to rank it among them ; but as it resembles those above described, in the pe-

culiar form of its toes, and bears some similitude in its manners also, I will for once sacrifice method to brevity. The grebe is much larger than either of the former, and its plumage white and black : it differs also entirely in the shortness of its legs, which are made for swimming, and not walking : in fact, they are from the knee upward hid in the belly of the bird, and have consequently very little motion. By this mark, and by the scolloped fringe of the toes, may this bird be easily distinguished from all others.

As they are thus, from the shortness of their wings, ill formed for flying, and from the uncommon shortness of their legs, utterly unfitted for walking, they seldom leave the water, and chiefly frequent those broad shallow pools where their faculty of swimming can be turned to the greatest advantage, in fishing and seeking their prey.

They are chiefly, in this country, seen to frequent the meres of Shropshire and Cheshire ; where they breed among reeds and flags, in a floating nest, steeped steady by the weeds of the margin. The female is said to be a careful nurse of its young, being observed to feed them most assiduously with small eels ; and when the little brood is tired, the mother

will carry them, either on her back or under her wings. This bird preys upon fish, and is almost perpetually diving. It does not shew much more than the head above water; and is very difficult to be shot, as it darts down on the appearance of the least danger. It is never seen on land; and, though disturbed ever so often, will not leave that lake where alone, by diving and swimming, it can find food and security. It is chiefly sought for the skin of its breast, the plumage of which is of a most beautiful silvery white, and as glossy as satin. This part is made into tippets; but the skins are out of season about February, losing their bright colour; and in breeding-time their breasts are entirely bare.

OF
WATER-FOWL.

PART VI.

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WATER-FOWL

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C H A P. I.

Of Water-fowl in General.

IN settling the distinctions among the other classes of birds, there was some difficulty ; one tribe encroached so nearly upon the nature and habitudes of another, that it was not easy to draw the line which kept them asunder : but in water-fowl nature has marked them for us by a variety of indelible characters ; so that it would be almost as unlikely to mistake a land-fowl for one adapted for living and swimming among the waters, as a fish for a bird.

The first great distinction in this class, appears in the toes, which are webbed together for swimming. Those who have remarked the feet or toes of a duck, will easily conceive how admirable they are formed for making way in the water. When men swim they do not open the fingers, so as to let the fluid pass through them ; but closing them together, present one broad surface to beat back the water, and thus push their bodies along. What man performs by art, nature has supplied to water-fowl ; and, by broad skins, has webbed their toes together, so that they expand

two broad oars to the water ; and thus, moving them alternately, with the greatest ease paddle along. We must observe also, that the toes are so contrived, that as they strike backward, their broadest hollow surface beats the water ; but as they gather them in again, for a second blow, their front surface contracts, and does not impede the bird's progressive motion.

As their toes are webbed in the most convenient manner, so are their legs also made most fitly for swift progression in the water. The legs of all are short, except the three birds described in a former chapter ; namely, the flamingo, the avosetta, and the coriira : all which, for that reason, I have thought proper to rank among the crane kind, as they make little use of their toes in swimming. Except these, all web-footed birds have very short legs ; and these strike, while they swim, with greater facility. Were the leg long, it would act like a lever whose prop is placed to a disadvantage ; its motions would be slow, and the labour of moving it considerable. For this reason, the very few birds whose webbed feet are long, never make use of them in swimming : the web at the bottom seems only of service as a broad base, to prevent them from sinking while they walk in the mud ; but

it otherwise rather retards than advances their motion.

The shortness of the legs in the web-footed kinds, renders them as unfit for walking on land, as it qualifies them for swimming in their natural element. Their stay, therefore, upon land, is but short and transitory; and they seldom venture to breed far from the sides of those waters where they usually remain. In their breeding seasons, their young are brought up by the water-side; and they are covered with a warm down, to fit them for the coldness of their situation. The old ones also have a closer, warmer plumage, than birds of any other class. It is of their feathers that our beds are composed; as they neither mat nor imbibe humidity, but are furnished with an animal-oil, that glazes their surface, and keeps each separate. In some, however, this animal-oil is in too great abundance; and is as offensive from its smell as it is serviceable for the purposes of household oeconomy. The feathers, therefore, of all the penguin kind, are totally useless for domestic purposes; as neither boiling nor bleaching can divest them of their oily rancidity. Indeed, the rancidity of all new feathers, of whatever water-fowl they be, is so disgusting, that our upholsterers give near

double the price for old feathers that they afford for new? to be free from smell, they must all be lain upon for some time; and their usual method is to mix the new and the old together.

This quantity of oil, with which most water-fowl are supplied, contributes also to their warmth in the moist element where they reside. Their skin is generally lined with fat; so that, with the warmth of the feathers externally, and this natural lining more internally, they are better defended against the changes or the inclemencies of the weather, than any other class whatever.

As, among land-birds, there are some found fitted entirely for depredation, and others for an harmless method of subsisting upon vegetables, so also among these birds there are tribes of plunderers, that prey not only upon fish, but sometimes upon water-fowl themselves. There are likewise more inoffensive tribes, that live upon insects and vegetables only. Some water-fowls subsist by making sudden stoops from above, to seize whatever fish come near the surface; others again, not furnished with wings long enough to fit them for flight, take their prey by diving after it to the bottom.

From hence all water-fowl naturally fall into three distinctions. Those of the Gull kind, that,

with long legs and round bills, fly along the surface to seize their prey. Those of the Penguin kind, that, with round bills, legs hid in the abdomen, and short wings, dive after their prey : and thirdly ; those of the Goose kind, with flat broad bills, that lead harmless lives, and chiefly subsist upon insects and vegetables.

These are not speculative distinctions, made up for the arrangement of a system ; but they are strongly and evidently marked by Nature. The Gull kind are active and rapacious ; constantly, except when they breed, keeping upon the wing ; fitted for a life of rapine, with sharp straight bills for piercing, or hooked at the end for holding their fishy prey. In this class we may rank the Albatross, the Cormorant, the Gannet or Soland Goose, the Shag, the Frigate Bird, the Great Brown Gull, and all the lesser tribe of gulls and sea-swallows.

The Penguin kind, with appetites as voracious, bills as sharp, and equally eager for prey, are yet unqualified to obtain it by flight. Their wings are short, and their bodies large and heavy, so that they can neither run nor fly. But they are formed for diving in a very peculiar manner. Their feet are placed so far backward, and their legs so hid in the abdomen,

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that the slightest stroke sends them head foremost to the bottom of the water. To this class we may refer the Penguin, the Auk, the Skout, the Sea-turtle, the Bottle-nose and the Loon.

The Goose kind are easily distinguishable, by their flat broad bills, covered with a skin; and their manner of feeding, which is mostly upon vegetables. In this class we may place the Swan, the Goose, the Duck, the Teal, the Widgeon, and all their numerous varieties.

In describing the birds of these three classes, I will put the most remarkable of each class at the beginning of their respective tribes, and give their separate history: then, after having described the chiefs of the tribe, the more ordinary sorts will naturally fall in a body, and come under a general description, behind their leaders. But before I offer to pursue this methodical arrangement, I must give the history of a bird that, from the singularity of its conformation, seems allied to no species; and should therefore be separately described I mean the Pelican.

CHAP.

C H A P. II.

Of the Pelican.

THE Pelican of Africa is much larger in the body than a swan, and somewhat of the same shape and colour. Its four toes are all webbed together; and its neck in some measure resembles that of a swan: but that singularity in which it differs from all other birds is in the bill and the great pouch underneath, which are wonderful, and demand a distinct description. This enormous bill is fifteen inches from the point to the opening of the mouth, which is a good way back behind the eyes. At the base the bill is somewhat greenish, but varies towards the end, being of a reddish blue. It is very thick in the beginning, but tapers off to the end, where it hooks downwards. The under-chap is still more extraordinary; for to the lower edges of it hang a bag, reaching the whole length of the bill to the neck, which is said to be capable of containing fifteen quarts of water. This bag the bird has a power of wrinkling up into the hollow of the under-chap; but by opening the bill, and putting

one's hand down into the bag, it may be distended at pleasure. The skin of which it is formed will then be seen of a blueish ash-colour, with many fibres and veins running over its surface. It is not covered with feathers, but a short downy substance as smooth and as soft as satin, and is attached all along the under edges of the chap, to be fixed backward to the neck of the bird by proper ligaments, and reaches near half way down. When this bag is empty it is not seen; but when the bird has fished with success, it is then incredible to what an extent it is often seen dilated. For the first thing the pelican does in fishing is to fill up the bag; and then it returns to digest its burthen at leisure. When the bill is opened to its widest extent, a person may run his head into the bird's mouth, and conceal it in this monstrous pouch, thus adapted for very singular purposes. Yet this is nothing to what Ruysch assures us, who avers that a man has been seen to hide his whole leg, boot and all, in the monstrous jaws of one of these animals. At first appearance this would seem impossible, as the sides of the under chap, from which the bag depends, are not above an inch asunder when the bird's bill is first opened; but then they are capable of great separation; and it must necessarily be so,





De Sordel.

J. Taylor sculp.

1. Grebe.
2. Culterneb.
3. Pelican.

as the bird preys upon the largest fishes, and hides them by dozens in its pouch. Tertre affirms that it will hide as many fish as will serve sixty hungry men for a meal.

Such is the formation of this extraordinary bird, which is a native of Africa and America. The pelican was once also known in Europe, particularly in Russia; but it seems to have deserted our coasts. This is the bird of which so many fabulous accounts have been propagated; such as its feeding its young with own blood, and its carrying a provision of water for them in its great reservoir in the desert. But the absurdity of the first account answers itself; and as for the latter, the pelican uses its bag for very different purposes than that of filling it with water.

Its amazing pouch may be considered as analogous to the crop in other birds, with this difference, that as theirs lies at the bottom of the gullet, so this is placed at the top. Thus, as pigeons and other birds macerate their food for their young in their crops, and then supply them, so the pelican supplies its young by a more ready contrivance, and macerates their food in its bill, or stores it for its own particular sustenance.

The ancients were particularly fond of giving

this bird admirable qualities and parental affections: struck, perhaps, with its extraordinary figure, they were willing to supply it with as extraordinary appetites; and having found it with a large reservoir, they were pleased with turning it to the most tender and parental uses. But the truth is, the pelican is a very heavy, sluggish, voracious bird, and very ill fitted to take those flights, or to make those cautious provisions for a distant time, which we have been told they do. Father Labat, who seems to have studied their manners with great exactness, has given us a minute history of this bird, as found in America; and from him I will borrow mine.

The pelican, says Labat, has strong wings, furnished with thick plumage of an ash-colour, as are the rest of the feathers over the whole body. Its eyes are very small, when compared to the size of its head; there is a sadness in its countenance, and its whole air is melancholy. It is as dull and reluctant in its motions as the flamingo is sprightly and active. It is slow of flight; and when it rises to fly, performs it with difficulty and labour. Nothing, as it would seem, but the spur of necessity, could make these birds change their situation, or induce them to ascend into the air: but they must either starve or fly.

They are torpid and inactive to the last degree, so that nothing can exceed their indolence but their gluttony; it is only from the stimulations of hunger that they are excited to labour; for otherwise they would continue always in fixed repose. When they have raised themselves about thirty or forty feet above the surface of the sea, they turn their head with one eye downwards, and continue to fly in that posture. As soon as they perceive a fish sufficiently near the surface, they dart down upon it with the swiftness of an arrow, seize it with unerring certainty, and store it up in their pouch. They then rise again, though not without great labour, and continue hovering and fishing, with their head on one side as before.

This work they continue with great effort and industry till their bag is full, and then they fly to land to devour and digest at leisure the fruits of their industry. This, however, it would appear they are not long performing; for towards night they have another hungry call; and they again reluctantly go to labour. At night, when their fishing is over, and the toil of the day crowned with success, these lazy birds retire a little way from the shore; and, though with the webbed feet and clumsy figure of a goose, they will be contented to perch no where but upon trees

among the light and airy tenants of the forest, There they take their repose for the night; and often spend a great part of the day, except such times as they are fishing, sitting in dismal solemnity, and as it would seem half asleep. Their attitude is, with the head resting upon their great bag, and that resting upon their breast. There they remain without motion, or once changing their situation, till the calls of hunger break their repose, and till they find it indispensibly necessary to fill their magazine for a fresh meal. Thus their life is spent between sleeping and eating; and our author adds, that they are as foul as they are voracious, as they are every moment voiding excrements in heaps as large as one's fist.

The same indolent habits seem to attend them even in preparing for incubation, and defending their young when excluded. The female makes no preparation for her nest, nor seems to chuse any place in preference to lay in; but drops her eggs on the bare ground to the number of five or six, and there continues to hatch them. Attached to the place, without any desire of defending her eggs or her young, she tamely sits and suffers them to be taken from under her. Now and then she just ventures to peck, or to cry out when a person offers to beat her off.

She feeds her young with fish macerated for some time in her bag; and when they cry flies off for a new supply. Labat tells us that he took two of these when very young, and tied them by a leg to a post stuck into the ground, where he had the pleasure of seeing the old one for several days come to feed them, remaining with them the greatest part of the day, and spending the night on the branch of a tree that hung over them. By these means they were all three become so familiar, that they suffered themselves to be handled; and the young ones very kindly accepted whatever fish he offered them. These they always put first into their bag, and then swallowed at their leisure.

It seems, however, that they are but disagreeable and useless domestics; their gluttony can scarce be satisfied; their flesh smells very rancid; and tastes a thousand times worse than it smells. The native Americans kill vast numbers; not to eat, for they are not fit even for the banquet of a savage; but to convert their large bags into purses and tobacco-pouches. They bestow no small pains in dressing the skin with salt and ashes, rubbing it well with oil, and then forming it to their purpose. It thus becomes so soft and pliant, that the Spanish women sometimes adorn it

with gold and embroidery to make work-bags of.

Yet, with all the seeming hebetude of this bird, it is not entirely incapable of instruction in a domestic state. Father Raymond assures us, that he has seen one so tame and well educated among the native Americans, that it would go off in the morning at the word of command, and return before night to its master, with its great paunch distended with plunder; a part of which the savages would make it disgorge, and a part they would permit it to reserve for itself.

“The Pelican,” as Faber relates, “is not destitute of other qualifications. One of those which was brought alive to the Duke of Bavaria’s court, where it lived forty years, seemed to be possessed of very uncommon sensations. It was much delighted in the company and conversation of men, and in music both vocal and instrumental; for it would willingly stand,” says he, “by those that sung or sounded the trumpet; and stretching out its head, and turning its ear to the music, listened very attentively to its harmony, though its own voice was little pleasanter than the braying of an ass.” Gesner tells us that the emperor Maximilian had a tame pelican

which lived for above eighty years, and that always attended his army on their march. It was one of the largest of the kind, and had a daily allowance by the emperor's orders. As another proof of the great age to which the pelican lives, Aldrovandus makes mention of one of these birds that was kept several years at Mechlin, and was verily believed to be fifty years old.—We often see these birds at our shews about town.

Of the Albatross, the first of the Gull Kind.

THOUGH this is one of the largest and most formidable birds of Africa and America, yet we have but few accounts to enlighten us in its history. The figure of the bird is thus described by Edwards. "The body is rather
"larger than that of a pelican; and its
"wings when extended ten feet from tip to
"tip. The bill, which is six inches long, is
"yellowish, and terminates in a crooked point.
"The top of the head is of a bright brown; the
"back is of a dirty deep spotted brown; and
"the belly and under the wings is white; the
"toes, which are webbed, are of a flesh
"colour."

Such are the principal traits in this bird's figure: but these lead us a very short way in its history; and our naturalists have thought fit to say nothing more. However, I am apt to believe this bird to be the same with that described by Wicquefort, under the title of the Alcatraz; its size, its colours, and its prey incline me to think so. He describes it as a kind of great gull, as large in the body as a

goose of a brown colour, with a long bill, and living upon fish, of which they kill great numbers.

This bird is an inhabitant of the tropical climates, and also beyond them as far as the Streights of Magellan in the South Seas. It is one of the most fierce and formidable of the aquatic tribe, not only living upon fish, but also such small water-fowl as it can take by surprise. It preys, as all the gull-kind do, upon the wing; and chiefly pursues the flying-fish, that are forced from the sea by the dolphins. The ocean in that part of the world presents a very different appearance from the seas with which we are surrounded. In our seas we see nothing but a dreary expanse, ruffled by winds, and seemingly forsaken by every class of animated nature. But the tropical seas, and the distant southern latitudes beyond them, are all alive with birds and fishes, pursuing and pursued. Every various species of the gull-kind are there seen hovering on the wing, at a thousand miles distance from the shore. The flying-fish are every moment rising to escape from their pursuers of the deep, only to encounter equal dangers in the air. Just as they rise the dolphin is seen to dart after them, but generally in vain; the gull has more frequent success, and often takes them at their

rise; while the albatross pursues the gull, and obliges it to relinquish its prey: so that the whole horizon presents but one living picture of rapacity and evasion.

So much is certain; but how far we are to credit Wicquefort, in what he adds concerning this bird, the reader is left to determine. "As these birds, except when they breed, live entirely remote from land, so they are often seen, as it should seem, sleeping in the air. At night, when they are pressed by slumber, they rise into the clouds as high as they can; there, putting their head under one wing, they beat the air with the other, and seem to take their ease. After a time, however, the weight of their bodies, only thus half supported, brings them down; and they are seen descending, with a pretty rapid motion, to the surface of the sea. Upon this they again put forth their efforts to rise; and thus alternately ascend and descend at their ease. But it sometimes happens," says my author, "that, in these slumbering flights, they are off their guard, and fall upon deck, where they are taken."

What truth there may be in this account, I will not take it upon me to determine; but certain it is, that few birds float upon the air

with more ease than the albatross, or support themselves a longer time in that element. They seem never to feel the excesses of fatigue; but night and day upon the wing are always prowling, yet always emaciated and hungry.

But though this bird be one of the most formidable tyrants of the deep, there are some associations which even tyrants themselves form, to which they are induced either by caprice or necessity. The albatross seems to have a peculiar affection for the penguin, and a pleasure in its society. They are always seen to chuse the same places of breeding; some distant, uninhabited island, where the ground slants to the sea, as the penguin is not formed either for flying or climbing. In such places their nests are seen together, as if they stood in need of mutual assistance and protection. Captain Hunt, who for some time commanded at our settlement upon Falkland Islands, assures me, that he was often amazed at the union preserved between these birds, and the regularity with which they built together. In that bleak and desolate spot, where the birds had long continued undisturbed possessors, and no way dreaded the encroachments of men, they seemed to make their abode as comfortable as they expected it to be lasting. They were seen to

build with an amazing degree of uniformity ; their nests covering fields by thousands, and resembling a regular plantation. In the middle, on high, the albatross raised its nest, on heath sticks and long grass, about two feet above the surface : round this the penguins made their lower settlements, rather in holes in the ground ; and most usually eight penguins to one albatross. Nothing is a stronger proof of Mr. Buffon's fine observation, that the presence of man not only destroys the society of meaner animals, but their instincts also. These nests are now, I am told, totally destroyed ; the society is broke up ; and albatross and penguin have gone to breed upon more desert shores, in greater security.

C H A P. IV.

The Cormorant.

THE Cormorant is about the size of a large Muscovy duck, and may be distinguished from all other birds of this kind, by its four toes being united by membranes together; and by the middle toe being toothed or notched, like a saw, to assist it in holding its fishy prey. The head and neck of this bird are of a sooty blackness; and the body thick and heavy, more inclining in figure to that of the goose than the gull. The bill is straight, till near the end, where the upper chap bends into a hook.

But notwithstanding the seeming heaviness of its make, there are few birds more powerfully predaceous. As soon as the winter approaches, they are seen dispersed along the sea-shore, and ascending up the mouths of fresh-water rivers, carrying destruction to all the finny tribe. They are most remarkably voracious, and have a most sudden digestion. Their appetite is for ever craving, and never satisfied. This gnawing sensation may probably be increased by the great quantity of small worms that fill their intestines, and which their unceasing gluttony contributes to engender.

Thus formed with the grossest appetites, this unclean bird has the most rank and disagreeable smell, and is more foetid than even carrion, when in its most healthful state. Its form, says an ingenious modern, is disagreeable; its voice is hoarse and croaking; and all its qualities obscene. No wonder then that Milton should make Satan personate this bird, when he sent him upon the basest purposes, to survey with pain the beauties of Paradise, and to fit devising death on the tree of life*. It has been remarked, however, of our poet, that the making a water-fowl perch on a tree, implied no great acquaintance with the history of nature. In vindication of Milton, Aristotle expressly says, that the cormorant is the only water-fowl that sits on trees. We have already seen the pelican of this number; and the cormorant's toes seem as fit for perching upon trees as for swimming; so that our epic bard seems to have been as deeply versed in natural history as in criticism.

Indeed, this bird seems to be of a multiform nature; and wherever fish are to be found, watches their migrations. It is seen as well by land as sea; it fishes in fresh-water lakes, as well as in the depths of the ocean; it builds

* Vide Pennant's Zoology, p. 477.

in the cliffs of rocks, as well as on trees; and preys not only in the day-time, but by night.

Its indefatigable nature, and its great power in catching fish, were probably the motives that induced some nations to breed this bird up tame, for the purposes of fishing; and Willughby assures us, it was once used in England for that purpose. The description of their manner of fishing is thus delivered by Faber.

“ When they carry them out of the rooms
 “ where they are kept, to the fish-pools, they
 “ hood-wink them, that they may not be fright-
 “ ed by the way. When they are come to
 “ the rivers, they take off their hoods; and
 “ having tied a leather thong round the lower
 “ part of their necks, that they may not
 “ swallow down the fish they catch, they throw
 “ them into the river. They presently dive
 “ under water; and there, for a long time,
 “ with wonderful swiftness, pursue the fish;
 “ and when they have caught them, rise
 “ to the top of the water, and pressing the
 “ fish lightly with their bills, swallow them;
 “ till each bird hath, after this manner, de-
 “ voured five or six fishes. Then their keepers
 “ call them to the fist, to which they readily
 “ fly; and, one after another, vomit up all
 “ their fish, a little bruised with the first nip

“ given in catching them. When they have
“ done fishing, setting the birds on some high
“ place, they loose the string from their necks,
“ leaving the passage to the stomach free and
“ open; and, for their reward, they throw
“ them part of their prey; to each one or two
“ fishes, which they will catch most dexterously,
“ as they are falling in the air.”

At present, the cormorant is trained up in every part of China for the same purpose, where there are many lakes and canals. “ To this
“ end,” says Le Comte, “ they are educated
“ as men rear up spaniels or hawks; and one
“ man can easily manage an hundred. The
“ fisher carries them out into the lake, perched
“ on the gunnel of his boat, where they continue tranquil, and expecting his orders with
“ patience. When arrived at the proper place,
“ at the first signal given each flies a different
“ way, to fulfil the task assigned it. It is very
“ pleasant, on this occasion, to behold with
“ what sagacity they portion out the lake or
“ the canal where they are upon duty. They
“ hunt about, they plunge, they rise an hundred times to the surface, until they have at
“ last found their prey. They then seize it
“ with their beak by the middle, and carry it
“ without fail to their master. When the fish

“ is too large, they then give each other mutual assistance : on seizes it by the head, the other by the tail, and in this manner carry it to the boat together. There the boat-man stretches out one of his long oars, on which they perch, and being delivered of their burden, they fly off to pursue their sport. When they are wearied, he lets them rest for a while; but they are never fed till their work is over. In this manner they supply a very plentiful table; but still their natural gluttony cannot be reclaimed even by education. They have always, while they fish, the same string fastened round their throats, to prevent them from devouring their prey, as otherwise they would at once satiate themselves, and discontinue their pursuit the moment they had filled their bellies.”

As for the rest, the cormorant is the best fisher of all birds; and though fat and heavy with the quantity it devours, is nevertheless generally upon the wing. The great activity with which it pursues, and from a vast height drops down to dive after its prey, offers one of the most amusing spectacles to those who stand upon a cliff on the shore. This large bird is seldom seen in the air, but where there are fish below; but then they must be near the

surface, before it will venture to louse upon them. If they are at a depth beyond what the impetus of its flight makes the cormorant capable of diving to, they certainly escape him; for this bird cannot move so fast under water, as the fish can swim. It seldom, however, makes an unsuccessful dip; and is often seen rising heavily, with a fish larger than it can readily devour. It sometimes also happens, that the cormorant has caught the fish by the tail; and consequently the fins prevent its being easily swallowed in that position. In this case, the bird is seen to toss its prey above its head, and very dexterously to catch it, when descending, by the proper end, and so swallow it with ease.

C H A P. V.

Of the Gannet or Soland Goose.

THE Gannet is of the size of a tame goose, but its wings much longer, being six feet over. The bill is six inches long, straight almost to the point, where it inclines down, and the sides are irregularly jagged, that it may hold its prey with greater security. It differs from the cormorant in size, being larger; in its colour, which is chiefly white; and by its having no nostrils, but in their place a long furrow that reaches almost to the end of the bill. From the corner of the mouth is a narrow slip of black bare skin, that extends to the hind part of the head; beneath the skin is another that, like the pouch of the pelican, is dilatable, and of size sufficient to contain five or six entire herrings, which in the breeding season it carries at once to its mate or its young.

These birds, which subsist entirely upon fish, chiefly resort to those uninhabited islands where their food is found in plenty, and men seldom come to disturb them. The islands to the north of Scotland, the Skelig islands off the coasts of Kerry, in Ireland, and those

that lie in the north sea off Norway, abound with them. But it is on the Bass island, in the Firth of Edinburgh, where they are seen in the greatest abundance. "There is a small island," says the celebrated Harvey, "called the Bass, "not more than a mile in circumference. "The surface is almost wholly covered during "the months of May and June with their nests, "their eggs and young. It is scarcely possible "to walk without treading on them: the flocks "of birds upon the wing, are so numerous, "as to darken the air like a cloud; and their "noise is such, that one cannot, without difficulty, be heard by the person next to him. "When one looks down upon the sea from "the precipice, its whole surface seems covered "with infinite numbers of birds of different "kinds, swimming and pursuing their prey. "If, in sailing round the island, one surveys "its hanging cliffs, in every crag or fissure "of the broken rocks, may be seen innumerable birds, of various sorts and sizes, more "than the stars of heaven, when viewed in a "serene night. If they are viewed at a distance, "either receding, or in their approach to the "island, they seem like one vast swarm of "bees."

They are not less frequent upon the rocks

of St. Kilda. Martin assures us, that the inhabitants of that small island consume annually near twenty-three thousand young birds of this species, besides an amazing quantity of their eggs. On these they principally subsist throughout the year; and from the number of these visitants, make an estimate of their plenty for the season. They preserve both the eggs and fowls in small pyramidal stone buildings, covering them with turf-ashes, to prevent the evaporation of their moisture.

The gannet is a bird of passage. In winter it seeks the more southern coasts of Cornwall, hovering over the shoals of herrings and pilchards that then come down from the northern seas: its first appearance in the northern islands is in the beginning of spring; and it continues to breed till the end of summer. But, in general, its motions are determined by the migrations of the immense shoals of herrings that come pouring down at that season through the British Channel, and supply all Europe as well as this bird with their spoil. The gannet assiduously attends the shoal in their passage, keeps with them in their whole circuit round our island, and shares with our fishermen this exhaustless banquet. As it is strong of wing, it never comes near the land; but is constant

to its prey. Wherever the gannet is seen, it is sure to announce to the fishermen the arrival of the finny tribe; they then prepare their nets, and take the herrings by millions at a draught; while the gannet, who came to give the first information, comes, though an unbidden guest, and often snatches its prey from the fishermen even in his boat. While the fishing season continues, the gannets are busily employed; but when the pilchards disappear from our coasts, the gannet takes its leave, to keep them company.

The cormorant has been remarked for the quickness of his sight; yet in this the gannet seems to exceed him. It is possessed of a transparent membrane under the eye-lid, with which it covers the whole eye at pleasure, without obscuring the sight in the smallest degree. This seems a necessary provision for the security of the eyes of so weighty a creature, whose method of taking prey, like that of the cormorant, is by darting headlong down from an height of an hundred feet and more into the water to seize it. These birds are sometimes taken at sea, by fastening a pilchard to a board, which they leave floating. The gannet instantly pounces down from above upon the board, and is killed or maimed by the shock of a body where it expected no resistance.

These birds breed but once a year, and lay but one egg, which being taken away, they lay another; if that is also taken, then a third; but never more for that season. Their egg is white, and rather less than that of the common goose; and their nest large, composed of such substances as are found floating on the surface of the sea. The young birds, during the first year, differ greatly in colour from the old ones; being of a dusky hue, speckled with numerous triangular white spots; and at that time resembling the colours of the speckled diver.

The Bass Island, where they chiefly breed, belongs to one proprietor; so that care is taken never to fright away the birds when laying, or to shoot them upon the wing. By that means, they are so confident as to alight and feed their young ones close beside you. They feed only upon fish, as was observed; yet the young gannet is counted a great dainty by the Scots, and sold very dear; so that the lord of the islet makes a considerable annual profit by the sale.

C H A P. VI.

Of smaller Gulls and Petrels.

HAVING described the manners of the great ones of this tribe, those of the smaller kinds may be easily infetred. They resemble the more powerful in their appetites for prey, but have not such certain methods of obtaining it. In general, therefore, the industry of this tribe and their audacity encrease in proportion to their imbecility; the great gulls live at the most remote distance from man; the smaller are obliged to reside wherever they can take their prey; and to come into the most populous places when solitude can no longer grant them a supply. In this class we may place the Gull, properly so called, of which there are above twenty different kinds; the Petrel, of which there are three; and the Sea Swallow, of which there are as many. The gulls may be distinguished by an angular knob on the lower chap; the petrels by their wanting this knob; and the sea-swallow by their bills, which are straight, slender, and sharp pointed. They all, however, agree in their appetites and their places of abode.

The gull, and all its varieties, is very well

known in every part of the kingdom. It is seen with a slow-sailing flight hovering over rivers to prey upon the smaller kinds of fish; it is seen following the plowman in fallow fields to pick up insects; and when living animal food does not offer, it has even been known to eat carrion and whatever else of the kind that offers. Gulls are found in great plenty in every place; but it is chiefly round our boldest rockiest shores that they are seen in the greatest abundance; it is there that the gull breeds and brings up its young; it is there that millions of them are heard screaming with discordant notes for months together.

Those who have been much upon our coasts know that there are two different kinds of shores; that which slants down to the water with a gentle declivity, and that which rises with a precipitate boldness, and seems set as a bulwark to repel the force of the invading deeps. It is to such shores as these that the whole tribe of the gull-kind resort, as the rocks offer them a retreat for their young, and the sea a sufficient supply. It is in the cavities of these rocks, of which the shore is composed, that the vast variety of sea-fowls retire to breed in safety. The waves beneath, that continually beat at the base, often wear

the shore into an impending boldness ; so that it seems to jut out over the water, while the raging of the sea makes the place inaccessible from below. These are the situations to which sea-fowl chiefly resort, and bring up their young in undisturbed security.

Those who have never observed our boldest coasts have no idea of their tremendous sublimity. The boasted works of art, the highest towers, and the noblest domes, are but ant-hills when put in comparison : the single cavity of a rock often exhibits a coping higher than the ceiling of a gothic cathedral. The face of the shore offers to the view a wall of massive stone ten times higher than our tallest steeples. What should we think of a precipice three quarters of a mile in height ; and yet the rocks of St. Kilda are still higher ! What must be our awe to approach the edge of that impending height, and to look down on the unfathomable vacuity below ; to ponder on the terrors of falling to the bottom, where the waves that swell like mountains are scarcely seen to curl on the surface, and the roar of an ocean a thousand leagues broad appears softer than the murmur of a brook ! It is in these formidable mansions that myriads of sea-fowls are for ever seen sporting, flying in security down the depth, half a mile

beneath the feet of the spectator. The crow and the chough avoid those frightful precipices; they chuse smaller heights, where they are less exposed to the tempest; it is the cormorant, the gannet, the tarröck, and the terne, that venture to these dreadful retreats, and claim an undisturbed possession. To the spectator from above, those birds, though some of them are above the size of an eagle, seem scarce as large as a swallow; and their loudest screaming is scarce perceptible.

But the generality of our shores are not so formidable. Though they may rise two hundred fathoms above the surface, yet it often happens that the water forsakes the shore at the departure of the tide, and leaves a noble and delightful walk for curiosity on the beach. Not to mention the variety of shells with which the sand is strewed, the lofty rocks that hang over the spectator's head, and that seem but just kept from falling, produce in him no unpleasing gloom. If to this be added the fluttering, the screaming, and the pursuits of myriads of water-birds, all either intent on the duties of incubation, or roused at the presence of a stranger, nothing can compose a scene of more peculiar solemnity. To walk along the shore when the tide is departed, or to sit in the hollow

of a rock when it is come in, attentive to the various sounds that gather on every side, above and below, may raise the mind to its highest and noblest exertions. The solemn roar of the waves swelling into and subsiding from the vast caverns beneath, the piercing note of the gull, the frequent chatter of the guillemot, the loud note of the auk, the scream of the heron, and the hoarse deep periodical croaking of the cormorant, all unite to furnish out the grandeur of the scene, and turn the mind to him who is the Effence of all sublimity.

Yet it often happens that the contemplation of a sea-shore produces ideas of an humbler kind, yet still not unpleasing. The various arts of these birds to seize their prey, and sometimes to elude their pursuers, their society among each other, and their tenderness and care of their young, produce gentler sensations. It is ridiculous also now and then to see their various ways of imposing upon each other. It is common enough, for instance, with the arctic gull, to pursue the lesser gulls so long, that they drop their excrements through fear, which the hungry hunter quickly gobbles up before it ever reaches the water. In breeding too they have frequent contests: one bird who has no nest of her own attempts to dispossess another,

and put herself in the place. This often happens among all the gull kind; and I have seen the poor bird, thus displaced by her more powerful invader, sit near the nest in pensive discontent, while the other seemed quite comfortable in her new habitation. Yet this place of pre-eminence is not easily obtained; for the instant the invader goes to snatch a momentary sustenance, the other enters upon her own, and always ventures another battle before she relinquishes the justness of her claim. The contemplation of a cliff thus covered with hatching-birds affords a very agreeable entertainment; and as they sit upon the ledges of the rocks, one above another, with their white breasts forward, the whole groupe has not unaptly been compared to an apothecary's shop.

These birds, like all others of the rapacious kind, lay but few eggs; and hence, in many places, their number is daily seen to diminish. The lessening of so many rapacious birds may, at first sight, appear a benefit to mankind; but when we consider how many of the natives of our islands are sustained by their flesh, either fresh or salted, we shall find no satisfaction in thinking that these poor people may in time lose their chief support. The gull in general, as was said, builds on the ledges of

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rocks, and lays from one egg to three, in a nest formed of long grass and sea-weed. Most of the kind are fishy tasted, with black stringy flesh; yet the young ones are better food: and of these, with several other birds of the penguin kind, the poor inhabitants of our northern islands make their wretched banquets. They have been long used to no other food; and even salted gull can be relished by those who know no better. Almost all delicacy is a relative thing; and the man who repines at the luxuries of a well-served table, starves not for want but from comparison. The luxuries of the poor are indeed coarse to us, yet still they are luxuries to those ignorant of better; and it is probable enough that a Kilda or a Feroe man may be found to exist, out-doing Apicius himself, in consulting the pleasures of the table. Indeed, if it be true that such meat as is the most dangerously earned is the sweetest, no men can dine so luxuriously as these, as none venture so hardly in the pursuit of a dinner. In Jacobson's History of the Feroe Islands, we have an account of the method in which those birds are taken; and I will deliver it in his own simple manner.

“ It cannot be expressed with what pains and
 “ danger they take these birds in those high
 “ steep cliffs, whereof many are two hundred fa-
 “ thoms

“ thoms high. But there are men apt by nature
 “ and fit for the work, who take them usually
 “ in two manners: they either climb from below
 “ into these high promontories, that are as steep
 “ as a wall; or they let themselves down with
 “ a rope from above. When they climb from
 “ below, they have a pole five or six ells long,
 “ with an iron hook at the end, which they
 “ that are below in the boat, or on the cliff,
 “ fasten unto the man’s girdle, helping him up
 “ thus to the highest place where he can get
 “ footing: afterwards they also help up another
 “ man; and thus several climb up as high as
 “ possibly they can; and where they find diffi-
 “ culty, they help each other up, by thrusting
 “ one another up with their poles. When the
 “ first hath taken footing, he draws the other
 “ up to him, by the rope fastened to his waste;
 “ and so they proceed, till they come to the
 “ place where the birds build. They there go
 “ about as well as they can, in those dangerous
 “ places; the one holding the rope at one end,
 “ and fixing himself to the rock; the other
 “ going at the other end from place to place.
 “ If it should happen that he chanceth to fall,
 “ the other that stands firm keeps him up, and
 “ helps him up again. But if he passeth safe,
 “ he likewise fastens himself till the other has

“ passed the same dangerous place also. Thus
“ they go about the cliffs after birds as they
“ please. It often happeneth, however, the
“ more is the pity, that when one doth not
“ stand fast enough, or is not sufficiently strong
“ to hold up the other in his fall, that they
“ both fall down and are killed. In this man-
“ ner some do perish every year.”

Mr. Peter Clanson, in his description of Norway, writeth, that there was anciently a law in that country, that whosoever climbed so on the cliffs, that he fell down and died, if the body was found, before burial, his next kinsman should go the same way; but if he durst not or could not do it, the dead body was not then to be buried in sanctified earth, as the person was too full of temerity, and his own destroyer.

“ When the fowlers are come, in the man-
“ ner aforefaid, to the birds within the cliffs,
“ where people seldom come, the birds are so
“ tame that they take them with their hands;
“ for they will not readily leave their young.
“ But when they are wild, they cast a net,
“ with which they are provided, over them,
“ and intangle them therein. In the mean
“ time, there lieth a boat beneath in the sea,
“ wherein they cast the birds killed; and in
“ this manner they can, in a short time, fill a

“boat with fowl. When it is pretty fair
“weather, and there is good fowling, the
“fowlers stay in the cliffs seven or eight days
“together ; for there are here and there holes
“in the rocks, where they can safely rest ; and
“they have meat let down to them with a line
“from the top of the mountain. In the mean
“time some go every day to them, to fetch
“home what they have taken.

“Some rocks are so difficult, that they can
“in no manner get unto them from below ;
“wherefore they seek to come down thereunto
“from above. For this purpose they have a
“rope, eighty or a hundred fathoms long,
“made of hemp, and three fingers thick. The
“fowler maketh the end of this fast about his
“waist, and between his legs, so that he can
“sit thereon ; and is thus let down, with the
“fowling staff in his hand. Six men hold by
“the rope, and let him easily down, laying a
“large piece of wood on the brink of the rock,
“upon which the rope glideth, that it may not
“be worn to pieces by the hard and rough edge
“of the stone. They have besides, another
“small line, that is fastened to the fowler’s
“body ; on which he pulleth, to give them
“notice how they should let down the great
“rope, either lower or higher ; or to hold still,

“ that he may stay in the place whereunto he
“ is come. Here the man is in great danger,
“ because of the stones that are loosened from
“ the cliff, by the swinging of the rope, and
“ he cannot avoid them. To remedy this, in
“ some measure, he hath usually on his head a
“ seaman’s thick and shaggy cap, which defends
“ him from the blows of the stones, if they be
“ not too big; and then it costeth him his life:
“ nevertheless, they continually put themselves
“ in that danger, for the wretched body’s food-
“ sake, hoping in God’s mercy and protection,
“ unto which the greatest part of them do de-
“ voutly recommend themselves when they go
“ to work: otherwise, they say, there is no
“ other great danger in it, except that it is a
“ toilsome and artificial labour; for he that
“ hath not learned to be so let down, and is
“ not used thereto, is turned about with the
“ rope, so that he soon groweth giddy, and
“ can do nothing; but he that hath learned the
“ art, considers it as a sport, swings himself
“ on the rope, sets his feet against the rock,
“ casts himself some fathoms from thence, and
“ shoots himself to what place he will: he knows
“ where the birds are, he understands how to
“ sit on the line in the air, and how to hold the
“ fowling-staff in his hand; striking therewith

“ the birds that come or fly away : and when
 “ there are holes in the rocks, and it stretches
 “ itself out, making underneath as a cieling,
 “ under which the birds are, he knoweth how
 “ to shoot himself in among them, and there
 “ take firm footing. There, when he is in
 “ these holes, he maketh himself loose of the
 “ rope, which he fastens to a crag of the rock,
 “ that it may not slip from him to the outside
 “ of the cliff. He then goes about in the
 “ rock, taking the fowl, either with his hands
 “ or with the fowling-staff. Thus, when he
 “ hath killed as many birds as he thinks fit, he
 “ ties them in a bundle, and fastens them to a
 “ little rope, giving a sign, by pulling, that
 “ they should draw them up. When he has
 “ wrought thus the whole day, and desires to
 “ get up again, he fitteth once more upon the
 “ great rope, giving a new sign, that they
 “ should pull him up ; or else he worketh him-
 “ self up, climbing along the rope, with his
 “ girdle full of birds. It is also usual, where
 “ there are not folks enough to hold the great
 “ rope, for the fowler to drive a post sloping
 “ into the earth, and to make a rope fast thereto,
 “ by which he lets himself down, without any
 “ body’s help, to work in the manner afore-

“ said. Some rocks are so formed that the
“ person can go into their cavities by land.

“ These manners are more terrible and dan-
“ gerous to see than to describe ; especially if
“ one considers the steepness and height of the
“ rocks, it seeming impossible for a man to
“ approach them, much less to climb or de-
“ scend. In some places, the fowlers are seen
“ climbing where they can only fasten the ends
“ of their toes and fingers ; not shunning such
“ places, though there be an hundred fathom
“ between them and the sea. It is a dear meat
“ for these poor people, for which they must
“ venture their lives ; and many, after long
“ venturing, do at last perish therein.

“ When the fowl is brought home, a part
“ thereof is eaten fresh ; another part, when
“ there is much taken, being hung up for
“ winter provision. The feathers are gathered,
“ to make merchandise of, for other expences.
“ The inhabitants get a great many of these
“ fowls, as God giveth his blessing and fit wea-
“ ther. When it is dark and hazy, they take
“ most ; for then the birds stay in the rocks :
“ but in clear weather, and hot sun-shine, they
“ seek the sea. When they prepare to depart
“ for the season, they keep themselves most
“ there, sitting on the cliffs towards the sea.

“fide, where people get at them sometimes
“with boats, and take them with fowling-
“staves.”

Such is the account of this historian ; but we are not to suppose that all the birds caught in this manner are of the gull kind : on the contrary, numbers of them are of the penguin kind ; auks, puffins, and guillemots. These all come, once a season, to breed in these recesses ; and retire in winter, to fish in more southern climates.

C H A P. VII.

Of the Penguin Kind : and first of the Great Magellanic Penguin.

THE gulls are long-winged, swift flyers, that hover over the most extensive seas, and dart down upon such fish as approach too near the surface. The Penguin kind are but ill fitted for flight, and still less for walking. Every body must have seen the aukward manner in which a duck, either wild or tame, attempts to change place: they must recollect with what softness and ease a gull or a kite waves its pinions, and with what a coil and flutter the duck attempts to move them; how many strokes it is obliged to give, in order to gather a little air; and even when it is thus raised, how soon it is fatigued with the force of its exertions, and obliged to take rest again. But the duck is not, in its natural state, half so unwieldy an animal as the whole tribe of the penguin kind. Their wings are much shorter, more scantily furnished with quills, and the whole pinion placed too forward, to be usefully employed. For this reason, the largest of the penguin kind, that have a thick, heavy body to raise, cannot

fly at all. Their wings serve them rather as paddles to help them forward, when they attempt to move swiftly; and in a manner walk along the surface of the water. Even the smaller kinds seldom fly by choice; they flutter their wings with the swiftest efforts without making way; and though they have but a small weight of body to sustain, yet they seldom venture to quit the water where they are provided with food and protection.

As the wings of the penguin tribe are unfitted for flight, their legs are still more awkwardly adapted for walking. This whole tribe have all above the knee hid within the belly; and nothing appears but two short legs, or feet, as some would call them, that seem stuck under the rump, and upon which the animal is very awkwardly supported. They seem, when sitting or attempting to walk, like a dog that has been taught to sit up, or to move a minuet. Their short legs drive the body in progression from side to side; and were they not assisted by their wings, they could scarcely move faster than a tortoise.

This awkward position of the legs, which so unqualifies them for living upon land, adapts them admirably for a residence in water. In that, the legs placed behind the moving body,

pushes it forward with greater velocity; and these birds, like Indian canoes, are the swiftest in the water, by having their paddles in the rear. Our sailors, for this reason, give these birds the very homely, but expressive, name of Arse-feet.

Nor are they less qualified for diving than swimming. By ever so little inclining their bodies forward, they lose their center of gravity; and every stroke from their feet only tends to sink them the faster. In this manner they can either dive at once to the bottom, or swim between two waters; where they continue fishing for some minutes, and then ascending, catch an instantaneous breath, to descend once more to renew their operations. Hence it is that these birds, which are so defenceless, and so easily taken by land, are impregnable by water. If they perceive themselves pursued in the least, they instantly sink, and shew nothing more than their bills, till the enemy is withdrawn. Their very internal conformation assists their power of keeping long under water. Their lungs are fitted with numerous vacuities, by which they can take in a very large inspiration; and this probably serves them for a length of time.

As they never visit land, except when they

come to breed, their feathers take a colour from their situation. That part of them which has been continually bathed in the water, is white; while their backs and wings are of different colours, according to the different species. They are also covered more warmly all over the body with feathers, than any other birds whatever; so that the sea seems entirely their element; and but for the necessary duties of propagating the species, we should scarcely have the smallest opportunity of seeing them, and should be utterly unacquainted with their history.

Of all this tribe, the Magellanic Penguin is the largest, and the most remarkable. In size it approaches near that of a tame goose. It never flies, as its wings are very short, and covered with stiff hard feathers, and are always seen expanded, and hanging uselessly down by the bird's sides. The upper part of the head, back and rump, are covered with stiff, black feathers; while the belly and breast, as is common with all of this kind, are of a snowy whiteness, except a line of black that is seen to cross the crop. The bill, which from the base to about half way is covered with wrinkles, is black, but marked crosswise with a stripe of yellow. They walk

erect with their heads on high, their fin-like wings hanging down like arms ; so that to see them at a distance, they look like so many children with white aprons. From hence they are said to unite in themselves the qualities of men, fowls, and fishes. Like men, they are upright ; like fowls, they are feathered ; and like fishes, they have fin-like instruments, that beat the water before, and serve for all the purposes of swimming rather than flying.

They feed upon fish ; and seldom come ashore, except in the breeding season. As the seas in that part of the world abound with a variety, they seldom want food ; and their extreme fatness seems a proof of the plenty in which they live. They dive with great rapidity, and are voracious to a great degree. One of them, described by Clusius, though but very young, would swallow an entire herring at a mouthful, and often three successively before it was appeased. In consequence of this gluttonous appetite, their flesh is rank and fishy ; though our sailors say, that *it is pretty good eating*. In some the flesh is so tough, and the feathers so thick, that they stand the blow of a scymitar without injury.

They are a bird of society ; and especially when they come on shore, they are seen drawn up

in rank and file, upon the ledge of a rock, standing together with the albatross, as if in consultation. This is previous to their laying, which generally begins in that part of the world in the month of November. Their preparations for laying are attended with no great trouble, as a small depression in the earth, without any other nest, serves for this purpose. The warmth of their feathers and the heat of their bodies is such, that the progress of incubation is carried on very rapidly.

But there is a difference in the manner of this bird's nestling in other countries; which I can only ascribe to the frequent disturbances it has received from man or quadrupedes in its recesses. In some places, instead of contenting itself with a superficial depression in the earth, the penguin is found to burrow two or three yards deep: in other places it is seen to forsake the level, and to clamber up the ledge of a rock, where it lays its egg, and hatches it in that bleak, exposed situation. These precautions may probably have been taken, in consequence of dear-bought experience. In those countries where the bird fears for her own safety, or that of her young, she may providentially provide against danger, by digging, or even by climbing; for both which she is but ill adapted by nature. In those places,

however, where the penguin has had but few visits from man, her nest is made, with the most confident security, in the middle of some large plain, where they are seen by thousands. In that unguarded situation, neither expecting nor fearing a powerful enemy, they continue to sit brooding; and even when man comes among them, have at first no apprehension of their danger. Some of this tribe have been called, by our seamen, the Booby, from the total insensibility which they shew when they are sought to their destruction. But it is not considered that these birds have never been taught to know the dangers of an human enemy: it is against the fox or the vulture that they have learned to defend themselves; but they have no idea of injury from a being so very unlike their natural opposers. The penguins, therefore, when our seamen first came among them, tamely suffered themselves to be knocked on the head, without even attempting an escape. They have stood to be shot at in flocks, without offering to move, in silent wonder, till every one of their number has been destroyed. Their attachment to their nests was still more powerful; for the females tamely suffered the men to approach and take their eggs, without any resistance. But the experience of a few of those unfriendly visits, has

long since taught them to be more upon their guard in chusing their situations; or to leave those retreats where they were so little able to oppose their invaders.

The penguin lays but one egg; and, in frequented shores, is found to burrow like a rabbit: sometimes three or four take possession of one hole, and hatch their young together. In the holes of the rocks, where Nature has made them a retreat, several of this tribe, as Linnæus assures us, are seen together. There the females lay their single egg in a common nest, and sit upon this their general possession by turns; while one is placed as a centinel, to give warning of approaching danger. The egg of the penguin, as well as of all this tribe, is very large for the size of the bird, being generally found bigger than that of a goose. But as there are many varieties of the penguin, and as they differ in size, from that of a Muscovy duck to a swan, the eggs differ in the same proportion.

C H A P. VIII.

Of the Auk, Puffin, and other Birds of the Penguin Kind.

OF a size far inferior to the penguin, but with nearly the same form, and exactly of the same appetites and manners, there is a very numerous tribe. These frequent our shores, and, like the penguin, have their legs placed behind. They have short wings, which are not totally incapable of flight; with round bills for seizing their prey, which is fish. They live upon the water, in which they are continually seen diving; and seldom venture upon land, except for the purposes of continuing their kind.

The first of this smaller tribe is the Great Northern Diver, which is nearly of the size of a goose: it is beautifully variegated all over with many stripes, and differs from the penguin, in being much slenderer and more elegantly formed. The Grey Speckled Diver does not exceed the size of a Muscovy duck; and, except in size, greatly resembles the former. The Auk, which breeds on the islands of St. Kilda, and chiefly differs from the penguin
in

in size and colour. It is smaller than a duck; and the whole of the breast and belly, as far as the middle of the throat, is white. The Guillemot is about the same size; it differs from the auk, in having a longer, a slenderer, and a straighter bill. The Scarlet Throated Diver may be distinguished by its name; and the Puffin or Coulterneb, is one of the most remarkable birds we know.

Words cannot easily describe the form of the bill of the puffin, which differs so greatly from that of any other bird. Those who have seen the coulter of a plough, may form some idea of the beak of this odd-looking animal. The bill is flat; but, very different from that of the duck, its edge is upwards. It is of a triangular figure, and ending in a sharp point; the upper chap bent a little downward, where it is joined to the head: and a certain callous substance encompassing its base, as in parrots. It is of two colours; ash-coloured near the base, and red towards the point. It has three furrows or grooves impressed in it; one in the livid part, two in the red. The eyes are fenced with a protuberant skin, of a livid-colour; and they are grey or ash-coloured. These are marks sufficient to distinguish this bird by; but its

value to those in whose vicinity it breeds, renders it still more an object of curiosity.

The puffin, like all the rest of this kind, has its legs thrown so far back, that it can hardly move without tumbling. This makes it rise with difficulty, and subject to many falls before it gets upon the wing; but as it is a small bird, not much bigger than a pigeon, when it once rises, it can continue its flight with great celerity.

Both this and all the former build no nest; but lay their eggs either in the crevices of rocks, or in holes under ground near the shore. They chiefly chuse the latter situation; for the puffin, the auk, the guillemot, and the rest, cannot easily rise to the nest when in a lofty situation. Many are the attempts these birds are seen to make to fly up to those nests which are so high above the surface. In rendering them inaccessible to mankind, they often render them almost inaccessible to themselves. They are frequently obliged to make three or four efforts, before they can come at the place of incubation. For this reason, the auk and guillemot, when they have once laid their single egg, which is extremely large for the size, seldom forsake it until it is excluded. The male, who is better furnished for flight,

feeds the female during this interval; and so bare is the place where she sits, that the egg would often roll down from the rock, did not the body of the bird support it.

But the puffin seldom chuses these inaccessible and troublesome heights for its situation. Relying on its courage, and the strength of its bill, with which it bites most terribly, it either makes or finds a hole in the ground, where to lay and bring forth its young. All the winter these birds, like the rest, are absent; visiting regions too remote for discovery. At the latter end of March, or the beginning of April, come over a troop of their spies or harbingers, that stay two or three days, as it were to view and search out for their former situations, and see whether all be well. This done, they once more depart; and, about the beginning of May, return again with the whole army of their companions. But if the season happens to be stormy and tempestuous, and the sea troubled, the unfortunate voyagers undergo incredible hardships; and they are found, by hundreds, cast away upon the shores, lean and perished with famine*. It is most probable, therefore, that this voyage is performed more on the water than in the air; and as they cannot fish

* Willughby's Ornith. p. 326.

in stormy weather, their strength is exhausted before they can arrive at their wished-for harbour.

The puffin, when it prepares for breeding, which always happens a few days after its arrival, begins to scrape up an hole in the ground not far from the shore; and when it has some way penetrated the earth, it then throws itself upon its back, and with bill and claws thus burrows inward, till it has dug a hole with several windings and turnings, from eight to ten feet deep. It particularly seeks to dig under a stone, where it expects the greatest security. In this fortified retreat it lays one egg; which, though the bird be not much bigger than a pigeon, is of the size of a hen.

When the young one is excluded, the parent's industry and courage is incredible. Few birds or beasts will venture to attack them in their retreats. When the great sea-raven, as Jacobson informs us, comes to take away their young, the puffins boldly oppose him. Their meeting affords a most singular combat. As soon as the raven approaches, the puffin catches him under the throat with its beak, and sticks its claws into his breast, which makes the raven, with a loud screaming, attempt to get away; but the little bird still holds fast to the invader,

nor lets him go till they both come to the sea, where they drop down together, and the raven is drowned: yet the raven is but too often successful; and invading the puffin at the bottom of its hole, devours both the parent and its family.

But were a punishment to be inflicted for immorality in irrational animals, the puffin is justly a sufferer from invasion, as it is often itself one of the most terrible invaders. Near the Isle of Anglesey, in an islet called Priesholm, their flocks may be compared, for multitude, to swarms of bees. In another islet, called the Calf of Man, a bird of this kind, but of a different species, is seen in great abundance. In both places, numbers of rabbits are found to breed; but the puffin, unwilling to be at the trouble of making a hole, when there is one ready made, dispossesses the rabbits, and it is not unlikely destroys their young. It is in these unjustly acquired retreats that the young puffins are found in great numbers, and become a very valuable acquisition to the natives of the place. The old ones (I am now speaking of the Manks puffin) early in the morning, at break of day, leave their nests and young, and even the island, nor do they return till night-fall. All this time they are diligently

employed in fishing for their young; so that their retreats on land, which in the morning were loud and clamorous, are now still and quiet, with not a wing stirring till the approach of dusk, when their screams once more announce their return. Whatever fish, or other food, they have procured in the day, by night begins to suffer a kind of half digestion, and is reduced to an oily matter, which is ejected from the stomach of the old ones into the mouth of the young. By this they are nourished, and become fat to an amazing degree. When they are arrived to their full growth, they who are intrusted by the lord of the island, draw them from their holes; and, that they may more readily keep an account of the number they take, cut off one foot as a token. Their flesh is said to be excessively rank, as they feed upon fish, especially sprats and sea-weed; however, when they are pickled and preserved with spices, they are admired by those who are fond of high eating. We are told, that formerly their flesh was allowed by the church on Lenten days. They were, at that time, also taken by ferrets, as we do rabbits. At present, they are either dug out, or drawn out, from their burrows, with an hooked stick. They bite extremely hard, and keep such fast hold of whatsoever

they seize upon, as not to be easily disengaged. Their noise when taken is very disagreeable, being like the efforts of a dumb person attempting to speak.

The constant depredation, which these birds annually suffer, does not in the last seem to intimidate them, or drive them away: on the contrary, as the people say, the nest must be robbed, or the old ones will breed there no longer. All birds of this kind lay but one egg; yet if that be taken away, they will lay another, and so on to a third; which seems to imply that robbing their nests does not much intimidate them from laying again. Those, however, whose nests have been thus destroyed, are often too late in bringing up their young; who, if they be not fledged are prepared for migration when all the rest depart, are left at land to shift for themselves. In August the whole tribe is seen to take leave of their summer residence; nor are they observed any more till the return of the ensuing spring. It is probable that they sail away to more southern regions, as our mariners frequently see myriads of water-fowl upon their return, and steering usually to the north. Indeed, the coldest countries seem to be their most favoured retreats; and the number of water-fowl is much greater in those

colder climates, than in the warmer regions, near the line. The quantity of oil which abound in their bodies, serves as a defence against cold, and preserves them in vigour against its severity; but the same provision of oil is rather detrimental in warm countries, as it turns rancid, and many of them die of disorders which arise from its putrefaction. In general, however, water-fowl can be properly said to be of no climate; the element upon which they live, being their proper residence. They necessarily spend a few months of summer upon land, to bring up their young: but the rest of their time is probably consumed in their migrations, or near some unknown coasts, where their provision of fish is found in greatest abundance.

Before I go to the third general division of water-fowls, it may not be improper to observe, that there is one species of round-billed water-fowl, that does not properly lie within any of the former distributions. This is the Goose-ander; a bird with the body and wing shaped like those of the penguin kind, but with legs not hid in the belly. It may be distinguished from all others by its bill, which is round, hooked at the point, and toothed, both upper and under chap, like a saw. Its colours are

various and beautiful : however, its manners and appetites entirely resemble those of the Diver. It feeds upon fish, for which it dives ; and is said to build its nest upon trees, like the heron and the cormorant. It seems to form the shade between the penguin and the goose kind : having a round bill, like the one ; and unembarrassed legs, like the other. In the shape of the head, neck and body, it resembles them both.

C H A P. IX.

Of Birds of the Goose Kind, properly so called.

THE Swan, the Goose, and the Duck, are leaders of a numerous, useful, and beautiful tribe of birds, that we have reclaimed from a state of nature, and have taught to live in dependence about us. To describe any of these would be as superfluous as definitions usually are when given of things with which we are already well acquainted. There are few that have not had opportunities of seeing them, and whose ideas would not anticipate our description. But, though nothing be so easy as to distinguish these in general from each other, yet the largest of the duck-kind approach the goose so nearly, that it may be proper to mark the distinctions.

The marks of the goose are, a bigger body, large wings, a longer neck, a white ring about the rump, a bill thicker at the base, slenderer towards the tip, with shorter legs, placed more forward on the body. They both have a waddling walk; but the duck, from the position of its legs, has it in a greater degree. By these marks, these similar tribes may be known

asunder; and though the duck should be found to equal the goose in size, which sometimes happens, yet there are still other sufficient distinctions.

But they all agree in many particulars; and have a nearer affinity to each other than the neighbouring kinds in any other department. Their having been tamed has produced alterations in each, by which they differ as much from the wild ones of their respective kinds as they do among themselves. There is nearly as much difference between the wild and the tame duck, as between some sorts of the duck and the goose; but still, the characteristics of the kind are strongly marked and obvious; and this tribe can never be mistaken.

The bill is the first great obvious distinction of the goose-kind from all of the feathered tribe. In other birds it is round and wedge-like, or crooked at the end. In all the goose kind it is flat and broad, made for the purposes of skimming ponds and lakes of the mantling weeds that stand on the surface. The bills of other birds are made of an horny substance throughout; these have their inoffensive bills sheathed with a skin which covers them all over. The bill of every other bird seems in some measure formed for piercing or tearing; theirs are only

fitted for shoveling up their food, which is chiefly of the vegetable kind.

Though these birds do not reject animal food when offered them, yet they can contentedly subsist upon vegetables, and seldom seek any other. They are easily provided for; wherever there is water, there seems to be plenty. All the other web-footed tribes are continually voracious, continually preying. These lead more harmless lives: the weeds on the surface of the water, or the insects at the bottom, the grass by the bank, or the fruits and corn in cultivated grounds, are sufficient to satisfy their easy appetites: yet these, like every other animal, will not reject flesh, if properly prepared for them; it is sufficient praise to them that they do not eagerly pursue it.

As their food is chiefly vegetables, so their fecundity is in proportion. We have had frequent opportunities to observe, that all the predatory tribes, whether of birds or quadrupedes, are barren and unfruitful. We have seen the lion with its two cubs; the eagle with the same number; and the penguin with even but one. Nature that has supplied them with powers of destruction, has denied them fertility. But it is otherwise with these harmless animals I am describing. They seem formed to fill up the chasms in animated nature, caused by the vo-

raciousness of others. They breed in great abundance, and lead their young to the pool the instant they are excluded.

As their food is simple, so their flesh is nourishing and wholesome. The swan was considered as a high delicacy among the ancients; the goose was abstained from as totally indigestible. Modern manners have inverted tastes; the goose is now become the favourite; and the swan is seldom brought to table unless for the purposes of ostentation. But at all times the flesh of the duck was in high esteem; the ancients thought even more highly of it than we do. We are contented to eat it as a delicacy; they also considered it as a medicine; and Plutarch assures us, that Cato kept his whole family in health, by feeding them with duck whenever they threatened to be out of order.

These qualities of great fecundity, easy sustenance, and wholesome nourishment, have been found so considerable as to induce man to take these birds from a state of nature and render them domestic. How long they have been thus dependants upon his pleasures is not known; for from the earliest accounts, they were considered as familiars about him. The time must have been very remote; for there have been many changes wrought in

their colours, their figures, and even their internal parts, by human cultivation. The different kinds of these birds, in a wild state, are simple in their colourings: when one has seen a wild goose or a wild duck, a description of its plumage will, to a feather, exactly correspond with that of any other. But in the tame kinds no two of any species are exactly alike. Different in their size, their colours, and frequently in their general form, they seem the mere creatures of art; and, having been so long dependent upon man for support, they seem to assume forms entirely suited to his pleasures or necessities.

C H A P. X.

Of the Swan, tame and wild.

NO bird makes a more indifferent figure upon land, or a more beautiful one in the water, than the Swan. When it ascends from its favourite element, its motions are awkward, and its neck is stretched forward with an air of stupidity; but when it is seen smoothly sailing along the water, commanding a thousand graceful attitudes, moving at pleasure without the smallest effort, when it “proudly rows its state,” as Milton has it, “with arched neck, “between its white wings mantling,” there is not a more beautiful figure in all nature. In the exhibition of its form, there are no broken or harsh lines; no constrained or catching motions; but the roundest contours, and the easiest transitions; the eye wanders over every part with insatiable pleasure, and every part takes a new grace with new motion.

This fine bird has long been rendered domestic; and it is now a doubt whether there be any of the tame kind in a state of nature. The wild swan, though so strongly resembling this in colour and form, is yet a different bird; for it is very differently formed within. The wild

swan is less than the tame almost a fourth; for as the one weighs twenty pounds, the other only weighs sixteen pounds and three quarters. The colours of the tame swan is all over white; that of the wild bird is, along the back and the tips of the wings, of ash-colour. But these are slight differences, compared to what are found upon dissection. In the tame swan, the wind-pipe sinks down into the lungs in the ordinary manner; but in the wild, after a strange and wonderful contortion, like what we have seen in the crane, it enters through a hole formed in the breast-bone; and being reflected therein, returns by the same aperture; and being contracted into a narrow compass by a broad and bony cartilage, it is divided into two branches, which, before they enter the lungs, are dilated and as it were swollen out into two cavities.

Such is the extraordinary difference between these two animals, which externally seem to be of one species. Whether it is in the power of long continued captivity and domestication to produce this strange variety, between birds otherwise the same, I will not take upon me to determine. But certain it is, that our tame swan is no where to be found, at least in Europe, in a state of nature.

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As it is not easy to account for this difference of conformation, so it is still more difficult to reconcile the accounts of the ancients with the experience of the moderns, concerning the vocal powers of this bird. The tame swan is one of the most silent of all birds; and the wild one has a note extremely loud and disagreeable. It is probable, the convolutions of the wind-pipe may contribute to encrease the clangor of it; for such is the harshness of its voice, that the bird from thence has been called the Hooper. In neither is there the smallest degree of melody; nor have they, for above this century, been said to give specimens of the smallest musical abilities: yet, notwithstanding this, it was the general opinion of antiquity, that the swan was a most melodious bird; and that, even to its death, its voice went on improving. It would shew no learning to produce what they have said upon the music of the swan: it has already been collected by Aldrovandus; and still more professedly by the Abbé Gedoyn, in the Transactions of the Academy of Belles Lettres. From these accounts it appears that, while Plato, Aristotle, and Diodorus Siculus, believed the vocality of the swan, Pliny and Virgil seem to doubt that received opinion. In this equipoise of authority, Aldrovandus seems

to have determined in favour of the Greek philosophers; and the form of the wind-pipe in the wild swan, so much resembling a musical instrument, inclined his belief still more strongly. In aid of this also, came the testimony of Pendasius, who affirmed, that he had often heard swans sweetly singing in the lake of Mantua, as he was rowed up and down in a boat; as also of Olaus Wormius, who professed that many of his friends and scholars had heard them singing. "There was," says he, "in my family, a very honest young man, John Rostorph, a student in divinity, and a Norwegian by nation. This man did, upon his credit, and with the interposition of an oath, solemnly affirm that once, in the territory of Dronten, as he was standing on the sea shore, early in the morning, he heard an unusual and sweet murmur, composed of most pleasant whistlings and sounds; he knew not at first whence they came, or how they were made, for he saw no man near to produce them; but looking round about him, and climbing to the top of a certain promontory, he there espied an infinite number of swans gathered together in a bay, and making the most delightful harmony: a sweeter in all his life-time he had never heard." These were accounts sufficient at least to keep opinion in suspense, though in con-

tradiction to our own experience; but Aldrovandus, to put, as he supposed, the question past all doubt, gives us the testimony of a countryman of our own, from whom he had the relation. This honest man's name was Mr. George Braun; who assured him, that nothing was more common in England, than to hear swans sing; that they were bred in great numbers in the sea, near London; and that every fleet of ships that returned from their voyages from distant countries, were met by swans, that came joyfully out to welcome their return, and salute them with a loud and chearful singing! It was in this manner that Aldrovandus, that great and good man, was frequently imposed upon by the designing and the needy: his unbounded curiosity drew round him people of every kind, and his generosity was as ready to reward falsehood as truth.—Poor Aldrovandus! after having spent a vast fortune, for the purposes of enlightening mankind; after having collected more truth and more falsehood than any man ever did before him, he little thought of being reduced at last to want bread, to feel the ingratitude of his country, and to die a beggar in a public hospital!

Thus it appears that our modern authorities, in favour of the singing of swans, are rather

suspicious, since they are reduced to this Mr. George Braun, and John Rostorph, the native of a country remarkable for ignorance and credulity. It is probable the ancients had some mythological meaning in ascribing melody to the swan; and as for the moderns, they scarce deserve our regard. The swan, therefore, must be content with that share of fame which it possesses on the score of its beauty; since the melody of its voice, without better testimony, will scarcely be admitted by even the credulous.

This beautiful bird is as delicate in its appetites, as elegant in its form. Its chief food in corn, bread, herbs growing in the water, and roots and seeds, which are found near the margin. It prepares a nest in some retired part of the bank, and chiefly where there is an islet in the stream. This is composed of water-plants, long grass and sticks; and the male and female assist in forming it with great assiduity. The swan lays seven or eight eggs, white, much larger than those of a goose, with a hard, and sometimes a tuberos shell. It sits near two months before its young are excluded; which are ash-coloured when they first leave the shell, and for some months after. It is not a little dangerous to approach the old ones, when their little family are feeding round them. Their

fears, as well as their pride, seems to take the alarm; and they have sometimes been known to give a blow with their pinion, that has broke a man's leg or arm.

It is not till they are a twelve-month old that the young swans change their colour with their plumage. All the stages of this bird's approach to maturity are slow, and seem to mark its longevity. It is two months hatching; a year in growing to its proper size; and if, according to Pliny's observation, that those animals that are longest in the womb are the longest lived, the swan is the longest in the shell of any bird we know, and is said to be remarkable for its longevity. Some say that it lives three hundred years; and Willughby, who is in general diffident enough, seems to believe the report. A goose, as he justly observes, has been known to live an hundred; and the swan, from its superior size, and from its harder, firmer flesh, may naturally be supposed to live still longer.

Swans were formerly held in such great esteem in England, that, by an act of Edward the Fourth, none, except the son of the king, was permitted to keep a swan, unless possessed of five marks a year. By a subsequent act, the punishment for taking their eggs was impris-

ment for a year and a day, and a fine at the king's will. At present they are but little valued for the delicacy of their flesh; but many are still preserved for their beauty. - We see multitudes on the Thames and Trent; but no where greater numbers than on the salt water inlet of the sea near Abbotsbury, in Dorsetshire.

C H A P. XI.

Of the Goose and its Varieties,

THE Goose, in its domestic state, exhibits a variety of colours. The wild goose always retains the same marks: the whole upper part is ash-coloured; the breast and belly are of a dirty white; the bill is narrow at the base, and at the tip it is black; the legs are of a saffron colour, and the claws black. These marks are seldom found in the tame; whose bill is entirely red, and whose legs are entirely brown. The wild goose is rather less than the tame; but both invariably retain a white ring round their tail, which shews that they are both descended from the same original.

The wild goose is supposed to breed in the northern parts of Europe; and, in the beginning of winter, to descend into more temperate regions. They are often seen flying at very great heights, in flocks from fifty to an hundred, and seldom resting by day. Their cry is frequently heard when they are at an imperceptible distance above us; and this seems bandied from one to the other, as among hounds in the pursuit. Whether this be the note of mutual encouragement, or the necessary consequence of respiration, is doubtful; but they seldom exert it when they alight in these journies.

Upon their coming to the ground by day, they range themselves in a line, like cranes; and seem rather to have descended for rest, than for other refreshment. When they have sat in this manner for an hour or two, I have heard one of them, with a loud long note, sound a kind of charge, to which the rest punctually attended, and they pursued their journey with renewed alacrity. Their flight is very regularly arranged: they either go in a line a-breast, or in two lines, joining in an angle in the middle. I doubt whether the form of their flight be thus arranged to cut the air

with greater ease, as is commonly believed ; I am more apt to think it is to present a smaller mark to fowlers from below. A bullet might easily reach them, if huddled together in a flock, and the same discharge might destroy several at once ; but, by their manner of flying, no shot from below can affect above one of them ; and from the height at which they fly, this is not easy to be hit.

The Barnacle differs in some respects from both these ; being less than either, with a black bill, much shorter than either of the preceding. It is scarce necessary to combat the idle error of this bird's being bred from a shell sticking to ship's bottoms ; it is well known to be hatched from an egg, in the ordinary manner, and to differ in very few particulars from all the rest of its kind.

The Brent Goose is still less than the former, and not bigger than a Muscovy duck, except that the body is longer. The head, neck, and upper part of the breast, are black ; about the middle of the neck, on each side, are two small spots or lines of white, which together appear like a ring.

These, and many other varieties, are found in this kind ; which agree in one common cha-

rafter of feeding upon vegetables, and being remarkable for their fecundity. Of these, however, the tame goose is the most fruitful. Having less to fear from its enemies, leading a securer and a more plentiful life, its prolific powers encrease in proportion to its ease; and though the wild goose seldom lays above eight eggs, the tame goose is often seen to lay above twenty. The female hatches her eggs with great assiduity; while the Gander visits her twice or thrice a day, and sometimes drives her off to take her place, where he sits with great state and composure.

But beyond that of all animals is his pride when the young are excluded: he seems then to consider himself as a champion not only obliged to defend his young, but also to keep off the suspicion of danger; he pursues dogs and men that never attempt to molest him; and, though the most harmless thing alive, is then the most petulant and provoking. When, in this manner, he has pursued the calf or the mastiff, to whose contempt alone he is indebted for safety, he returns to his female and her brood in triumph, clapping his wings, screaming, and shewing all the marks of conscious superiority. It is probable, however, these arts succeed in raising his importance among the tribe

where they are displayed ; and it is probable there is not a more respectable animal on earth to a goose than a gander !

A young goose is generally reckoned very good eating ; yet the feathers of this bird still farther encrease its value. I feel my obligations to this animal every word I write ; for, however deficient a man's head may be, his pen is nimble enough upon every occasion : it is happy indeed for us, that it requires no great effort to put it in motion. But the feathers of this bird are still as valuable in another capacity, as they make the softest and the warmest beds to sleep on.

Of goose-feathers most of our beds in Europe are composed ; in the countries bordering on the Levant ; and in all Asia, the use of them is utterly unknown. They there use matresses, stuffed with wool, or camel's hair or cotton ; and the warmth of their climate may perhaps make them dispense with cushions of a softer kind. But how it happens that the ancients had not the use of feather-beds, is to me surprising : Pliny tell us, indeed, that they made bolsters of feathers to lay their heads on ; and this serves as a proof that they turned feathers to no other uses,

As feathers are a very valuable commodity, great numbers of geese are kept tame in the fens in Lincolnshire, which are plucked once or twice a year. These make a considerable article of commerce. The feathers of Somersetshire are most in esteem; those of Ireland are reckoned the worst. Hudson's Bay also furnishes very fine feathers, supposed to be of the goose kind. The down of the swan is brought from Dantzic. The same place also sends us great quantities of the feathers of the cock and hen; but Greenland, Iceland, and Norway, furnish the best feathers of all: and in this number we may reckon the Eider down, of which we shall take notice in its place. The best method of curing feathers, is to lay them in a room in an open exposure to the sun; and, when dried, to put them into bags, and beat them well with poles to get the dust off. But, after all, nothing will prevent, for a time, the heavy smell which arises from the putrefaction of the oil contained in every feather; no exposure will draw this off, how long soever it be continued; they must be lain upon, which is the only remedy: and, for this reason, old feathers are much more valuable than new.

C H A P. XII.

Of the Duck and its Varieties.

THE Tame Duck is the most easily reared of all our domestic animals. The very instincts of the young ones direct them to their favourite element; and though they are conducted by a hen, yet they despise the admonitions of their leader.

This serves as an incontestible proof that all birds have their manners rather from nature than education. A falcon pursues the partridge, not because it is taught by the old one, but because its appetites make their importunate call for animal food; the cuckoo follows a very different trade from that which its nurse endeavoured to teach it; and, if we may credit Pliny, in time destroys its instructor: animals of the duck kind also follow their appetites, not their tutor, and come to all their various perfections without any guide. All the arts possessed by man, are the result of accumulated experience; all the arts of inferior animals are self-taught, and scarce one acquired by imitation.

It is usual with the good women to lay duck-eggs under a hen, because she hatches them

better than the original parent would have done. The duck seems to be an heedless, inattentive mother; she frequently leaves her eggs till they spoil, and even seems to forget that she is entrusted with the charge: she is equally regardless of them when excluded; she leads them to the pond, and thinks she has sufficiently provided for her offspring when she has shewn them the water. Whatever advantages may be procured by coming near the house, or attending in the yard, she declines them all; and often lets the vermin, who haunt the waters, destroy them, rather than bring them to take shelter nearer home. The hen is a nurse of a very opposite character; she broods with the utmost assiduity, and generally brings forth a young one from every egg committed to her charge; she does not lead her younglings to the water indeed, but she watchfully guards them when there by standing at the brink. Should the rat, or the weazle, attempt to seize them, the hen can give them protection; she leads them to the house when tired with paddling, and rears up the supposititious brood, without ever suspecting that they belong to another.

The wild duck differs, in many respects, from the tame; and in them there is still greater

variety than among the domestic kinds. Of the tame duck there are not less than ten different sorts; and of the wild, Briffon reckons above twenty. The most obvious distinction between wild and tame ducks is in the colour of their feet; those of the tame duck being black; those of the wild duck yellow. The difference between wild ducks among each other, arises as well from their size as the nature of the place they feed in. Sea-ducks, which feed in the salt-water, and dive much, have a broad bill, bending upwards, a large hind toe, and a long blunt tail. Pond-ducks, which feed in plashe, have a straight and narrow bill, a small hind toe, and a sharp pointed train. The former are called, by our decoy-men, foreign ducks; the latter are supposed to be natives of England. It would be tedious to enter into the minute varieties of such a number of birds; all agreeing in the same general figure, the same habits and mode of living, and differing in little more than their size and the colours of their plumage. In this tribe, we may rank, as natives of our own European dominions, the Eider Duck, which is double the size of a common duck, with a black bill; the Velvet Duck, not so large, and with a yellow bill; the Scoter, with a knob at the base of a yellow bill; the Tufted Duck,

adorned with a thick crest ; the Scaup Duck, less than the common duck, with the bill of a greyish blue colour ; the Golden Eye, with a large white spot at the corners of the mouth, resembling an eye ; the Sheldrake, with the bill of a bright red, and swelling into a knob ; the Mallard, which is the stock from whence our tame breed has probably been produced ; the Pintail, with the two middle feathers of the tail three inches longer than the rest ; the Pochard, with the head and neck of a bright bay ; the Widgeon, with a lead-coloured bill, and the plumage of the back marked with narrow black and white undulated lines, but best known by its whistling sound : lastly, the Teal, which is the smallest of this kind, with the bill black, the head and upper part of the neck of a bright bay. These are the most common birds of the duck kind among ourselves ; but who can describe the amazing variety of this tribe, if he extends his view to the different quarters of the world ? The most noted of the foreign tribe are, the Muscovy duck, or, more properly speaking, the Musk Duck, so called from a supposed musky smell, with naked skin round the eyes, and which is a native of Africa. The Brazilian Duck, that is of the size of a goose, all over black except the tips of the wings. The American Wood Duck, with a variety of

beautiful colours, and a plume of feathers that falls from the back of the head like a friar's cowl. These, and twenty others, might be added, were encreasing the number of names the way to enlarge the sphere of our comprehension.

All these live in the manner of our domestic ducks, keeping together in flocks in the winter, and flying in pairs in summer, bringing up their young by the water-side, and leading them to their food as soon as out of the shell. Their nests are usually built among heath or rushes, not far from the water ; and they lay twelve, fourteen, or more eggs before they sit : yet this is not always their method ; the dangers they continually encounter from their ground situation, sometimes obliges them to change their manner of building ; and their aukward nests are often seen exalted on the tops of trees. This must be a very great labour to perform, as the duck's bill is but ill-formed for building a nest, and giving the materials of which it is composed a sufficient stability to stand the weather. The nest, whether high or low, is generally composed of singular materials. The longest grass, mixed with heath, and lined within with the bird's own feathers, usually go to the composition : however, in proportion as the climate

is colder, the nest is more artificially made, and more warmly lined. In the Arctic regions, nothing can exceed the great care all of this kind take to protect their eggs from the intenseness of the weather. While the gull and the penguin kind seem to disregard the severest cold, the duck, in those regions, forms itself a hole to lay in, shelters the approach, lines it with a layer of long grass and clay, within that another of moss, and lastly, a warm coat of feathers or down. The eider duck is particularly remarkable for the warmth of its nest. This bird, which, as was said, is above twice as large as the common duck, and resides in the colder climates, lays from six to eight eggs, making her nest among the rocks or the plants along the sea-shore. The external materials of the nest are such as are in common with the rest of the kind; but the inside lining, on which the eggs are immediately deposited, is at once the softest, warmest, and the lightest substance with which we are acquainted. This is no other than the inside down which covers the breast of the bird in the breeding-season. This the female pluck off with her bill, and furnishes the inside of her nest with a tapestry more valuable than the most skilful artists can produce. The natives watch the place where she begins to

build, and suffering her to lay, take away both the eggs and the nest. The duck, however, not discouraged by the first disappointment, builds and lays in the same place a second time; and this they in the same manner take away: the third time she builds, but the drake must supply the down from his breast to line the nest with: and, if this be robbed, they both forsake the place, and breed there no more. This down the natives take care to separate from the dirt and moss with which it is mixed; and, though no people stand in more need of a warm covering than themselves, yet their necessities compel them to sell it to the more indolent and luxurious inhabitants of the south, for brandy and tobacco.

As they possess the faculties of flying and swimming, so they are in general birds of passage, and it is most probable perform their journies across the ocean as well on the water as in the air. Those that migrate to this country, on the approach of winter, are seldom found so well tasted or so fat as the fowls that continue with us the year round: their flesh is often lean, and still oftner fishy; which flavour it has probably contracted in the journey, as their food in the lakes of Lapland, from whence they descend, is generally of the insect kind.

As soon as they arrive among us, they are generally seen flying in flocks to make a survey of those lakes where they intend to take up their residence for the winter. In the choice of these they have two objects in view; to be near their food, and yet remote from interruption. Their chief aim is to chuse some lake in the neighbourhood of a marsh, where there is at the same time a cover of woods, and where insects are found in greatest abundance. Lakes, therefore, with a marsh on one side and a wood on the other, are seldom without vast quantities of wild-fowl; and where a couple are seen at any time, that is a sufficient inducement to bring hundreds of others. The ducks flying in the air are often lured down from their heights by the loud voice of the mallard from below. Nature seems to have furnished this bird with very particular faculties for calling. The wind-pipe, where it begins to enter the lungs, opens into a kind of bony cavity, where the sound is reflected as in a musical instrument, and is heard a great way off. To this call all the stragglers resort; and in a week or fortnight's time, a lake that before was quite naked is black with water-fowl, that have left their Lapland retreats to keep company with our ducks who never stirred from home.

They generally chuse that part of the lake where they are inaccessible to the approach of the fowler, in which they all appear huddled together, extremely busy and very loud. What it is can employ them all the day is not easy to guess. There is no food for them at the place they sit and cabal thus, as they chuse the middle of the lake; and as for courtship, the season for that is not yet come; so that it is wonderful what can so busily keep them occupied. Not one of them seems a moment at rest. Now pursuing one another, now screaming, then all up at once, then down again; the whole seems one strange scene of bustle with nothing to do.

They frequently go off in a more private manner by night to feed in the adjacent meadows and ditches, which they dare not venture to approach by day. In these nocturnal adventures they are often taken; for, though a timorous bird, yet they are easily deceived, and every spring seems to succeed in taking them. But the greatest quantities are taken in decoys; which, though well known near London, are yet untried in the remoter parts of the country. The manner of making and managing a decoy is as follows.

A place is to be chosen for this purpose far remote from the common highway and all noise

of people. A decoy is best where there is a large pond surrounded by a wood, and beyond that a marshy and uncultivated country. When the place is chosen, the pool, if possible, is to be planted round with willows, unless a wood answers the purpose of shading it on every side. On the south and north side of this pool are two, three, or four ditches or channels, made broad towards the pool, and growing narrower till they end in a point. These channels are to be covered over with nets, supported by hooped sticks bending from one side to the other; so that they form a vault or arch growing narrower and narrower to the point, where it is terminated by a tunnel-net, like that in which fish are caught in weirs. Along the banks of these channels so netted over, which are called pipes, many hedges are made of reeds slanting to the edge of the channel, the acute angles to the side next the pool. The whole apparatus also is to be hidden from the pool by a hedge of reeds along the margin, behind which the fowler manages his operations. The place being fitted in this manner, the fowler is to provide himself with a number of wild ducks made tame, which are called decoys. These are always to be fed at the mouth or entrance of the pipe, and to be accustomed to come at a whistle.

As soon as the evening is set in, *the decoy rises*, as they term it, and the wild-fowl feed during the night. If the evening be still, the noise of their wings, during their flight, is heard at a very great distance, and produces no unpleasing sensation. The fowler, when he finds a fit opportunity, and sees his decoy covered with fowl, walks about the pool, and observes into what pipe the birds gathered in the pool may be enticed or driven. Then casting hemp-feed, or some such seed as will float on the surface of the water, at the entrance and up along the pipe, he whistles to his decoy-ducks, who instantly obey the summons, and come to the entrance of the pipe, in hopes of being fed as usual. Thither also they are followed by a whole flock of wild ones, who little suspect the danger preparing against them. Their sense of smelling however is very exquisite; and they would soon discover their enemy, but that the fowler always keeps a piece of turf burning at his nose, against which he breathes; and this prevents the effluvia of his person from reaching their exquisite senses. The wild-ducks, therefore, pursuing the decoy-ducks, are led into the broad mouth of the channel or pipe, nor have the least suspicion of the man who keeps hidden behind one of the hedges. When they

have got up the pipe, however, finding it grow more and more narrow, they begin to suspect danger, and would return back; but they are now prevented by the man, who shews himself at the broad end below. Thither, therefore, they dare not return; and rise they may not, as they are kept by the net above from ascending. The only way left them, therefore, is the narrow-funnelled net at the bottom; into this they fly, and there they are taken.

It often happens, however, that the wild-fowl are in such a state of sleepiness or dozing, that they will not follow the decoy-ducks. Use is then generally made of a dog who is taught his lesson. He passes backward and forward between the reed-hedges, in which there are little holes, both for the decoy-man to see and for the little dog to pass through. This attracts the eye of the wild-fowl; who, prompted by curiosity, advance towards this little animal, while he all the time keeps playing among the reeds, nearer and nearer the funnel, till they follow him too far to recede. Sometimes the dog will not attract their attention till a red handkerchief, or something very singular, be put about him. The decoy-ducks never enter the funnel-net with the rest, being taught to dive under water as soon as the rest are driven in.

The general season for catching fowl in decoys is from the latter end of October till February. The taking them earlier is prohibited by an act of George the Second, which imposes a penalty of five shillings for every bird destroyed at any other season.

The Lincolnshire decoys are commonly let at a certain annual rent, from five pounds to twenty pounds a year; and some even amount to thirty. These principally contribute to supply the markets of London with wild-fowl. The number of ducks, wigeon, and teal, that are sent thither is amazing. Above thirty thousand have been sent up in one season from ten decoys in the neighbourhood of Wainfleet. This quantity makes them so cheap on the spot, that it is asserted, the several decoy-men would be glad to contract for years to deliver their ducks at the next town for ten-pence the couple.

To this manner of taking wild-fowl in England, I will subjoin another still more extraordinary, frequently practised in China. Whenever the fowler sees a number of ducks settled in any particular plash of water, he sends off two or three gourds to float among them. These gourds resemble our pompions; but, being made hollow, they swim on the surface of the water; and on one pool there may some-

times be seen twenty or thirty of these gourds floating together. The fowl at first are a little shy of coming near them; but by degrees they come nearer; and as all birds at last grow familiar with a scare-crow, the ducks gather about these, and amuse themselves by whetting their bills against them. When the birds are as familiar with the gourds as the fowler could wish, he then prepares to deceive them in good earnest. He hollows out one of these gourds large enough to put his head in; and, making holes to breathe and see through, he claps it on his head. Thus accoutred, he wades slowly into the water, keeping his body under, and nothing but his head in the gourd above the surface; and in that manner moves imperceptibly towards the fowls, who suspect no danger. At last, however, he fairly gets in among them; while they, having been long used to see gourds, take not the least fright while the enemy is in the very midst of them; and an insidious enemy he is; for ever as he approaches a fowl, he seizes it by the legs, and draws it in a jerk under water. There he fastens it under his girdle, and goes to the next, till he has thus loaded himself with as many as he can carry away. When he has got his quantity, without ever attempting

to disturb the rest of the fowls on the pool, he slowly moves off again; and in this manner pays the flock three or four visits in a day. Of all the various artifices for catching fowl, this seems likely to be attended with the greatest success, as it is the most practised in China.

C H A P. XIII.

Of the King-Fisher.

I Will conclude this history of birds with one that seems to unite in itself somewhat of every class preceding. It seems at once possessed of appetites for prey like the rapacious kinds, with an attachment to water like the birds of that element. It exhibits in its form the beautiful plumage of the peacock, the shadings of the humming-bird, the bill of the crane, and the short legs of the swallow. The bird I mean is the King-Fisher, of which many extraordinary falsehoods have been propagated; and yet of which many extraordinary things remain to be said that are actually true.

The king-fisher is not much larger than a swallow; its shape is clumsy; the legs disproportionably small, and the bill disproportionably long; it is two inches from the base to the tip; the upper chap black, and the lower yellow; but the colours of this bird atone for its inelegant form; the crown of the head and the coverts of the wings are of a deep blackish green, spotted with bright azure; the back and tail are of the most resplendent azure; the whole under-side of the body is orange-coloured; a broad mark of the same passes from the bill beyond the eyes; beyond that is a large white spot: the tail is short, and consists of twelve feathers of a rich deep blue; the feet are of a reddish yellow, and the three joints of the outermost toe adhere to the middle toe, while the inner toe adheres only by one.

From the diminutive size, the slender short legs, and the beautiful colours of this bird, no person would be let to suppose it one of the most rapacious little animals that skims the deep. Yet it is for ever on the wing, and feeds on fish, which it takes in surprising quantities, when we consider its size and figure. It chiefly frequents the banks of rivers, and takes its prey after the manner of the osprey, balancing itself at a certain distance above the water for

a considerable space, then darting into the deep, and seizing the fish with inevitable certainty. While it remains suspended in the air, in a bright day, the plumage exhibits a beautiful variety of the most dazzling and brilliant colours. It might have been this extraordinary beauty that has given rise to fable; for wherever there is any thing uncommon, fancy is always willing to encrease the wonder.

Of this bird it has been said that she built her nest on the water, and thus in a few days hatched and produced her young. But, to be uninterrupted in this task, she was said to be possessed of a charm to allay the fury of the waves; and during this period the mariner might sail with the greatest security. The ancient poets are full of these fables; their historians are not exempt from them. Cicero has written a long poem in praise of the halcyon, of which there remains but two lines. Even the emperor Gordian has written a poem on this subject, of which we have nothing remaining. These fables have been adopted each by one of the earliest fathers of the church. "Behold," says St. Ambrose, "the little bird which in the midst of the winter lays her eggs on the sand by the shore. From that moment the winds are hushed; the sea becomes smooth;

“and the calm continues for fourteen days.
“This is the time she requires; seven days to
“hatch, and seven days to foster her young.
“Their Creator has taught these little animals
“to make their nest in the midst of the most
“stormy season, only to manifest his kindness
“by granting them a lasting calm. The sea-
“men are not ignorant of this blessing; they
“call this interval of fair weather their *halcyon*
“*days*; and they are particularly careful to
“seize the opportunity, as then they need fear
“no interruption.” This, and an hundred other
instances might be given of the credulity of
mankind with respect to this bird; they entered
into speculations concerning the manner of her
calming the deep, the formation of her nest,
and her peculiar sagacity; at present we do not
speculate, because we know, with respect to our
king-fisher, that most of the facts are false. It
may be alledged, indeed, with some shew of
reason, that the Halcyon of the ancients was a
different bird from our king-fisher; it may be
urged, that many birds, especially on the Indian
ocean, build a floating nest upon the sea; but
still the history of the ancient halcyon is clogged
with endless fable; and it is but an indifferent
method to vindicate falshood by shewing that
a part of the story is true.

The king-fisher with which we are acquainted at present, has none of those powers of allaying the storm, or building upon the waves; it is contented to make its nest on the banks of rivers, in such situations as not to be affected by the rising of the stream. When it has found a place for its purpose, it hollows out with its bill a hole about a yard deep; or if it finds the deserted hole of a rat, or one caused by the root of a tree decaying, it takes quiet possession. This hole it enlarges at the bottom to a good size; and, lining it with the down of the willow, lays its eggs there without any further preparation.

Its nest, or rather hole, is very different from that described by the ancients, by whom it is said to be made in the shape of a long-necked gourd of the bones of the sea-needle. The bones, indeed, are found there in great quantities as well as the scales of fishes; but these are the remains of the bird's food, and by no means brought there for the purposes of warmth or convenience. The king-fisher, as Bellonius says, feeds upon fish, but is incapable of digesting the bones and scales, which he throws up again as eagles and owls are seen to do a part of their prey. These fill the bird's nest of course; and, although they seem as if

designedly placed there, are only a kind of nuisance.

In these holes, which, from the remains of fish brought there, are very foetid, the king-fisher is often found with from five eggs to nine. There the female continues to hatch even though disturbed; and though the nest be robbed, she will again return and lay there. "I have had one of those females brought me," says Reaumur, "which was taken from her nest about three leagues from my house. After admiring the beauty of her colours, I let her fly again, when the fond creature was instantly seen to return back to the nest where she had just before been made a captive. There joining the male, she again began to lay, though it was for the third time, and though the season was very far advanced. At each time she had seven eggs. The older the nest is, the greater quantity of fish-bones and scales does it contain: these are disposed without any order; and sometimes take up a good deal of room."

The female begins to lay early in the season; and excludes her first brood about the beginning of April. The male, whose fidelity exceeds even that of the turtle, brings her large provisions of fish while she is thus employed; and

she, contrary to most other birds, is found plump and fat at that season. The male, that used to twitter before this, now enters the nest as quietly and as privately as possible. The young ones are hatched at the expiration of twenty days; but are seen to differ as well in their size as in their beauty.

As the ancients have had their fables concerning this bird, so have the modern vulgar. It is an opinion generally received among them that the flesh of the king-fisher will not corrupt, and that it will even banish all vermin. This has no better foundation than that which is said of its always pointing, when hung up dead, with its breast to the north. The only truth which can be affirmed of this bird when killed is, that its flesh is utterly unfit to be eaten; while its beautiful plumage preserves its lustre longer than that of any other bird we know.

Having thus given a short history of birds, I own I cannot take leave of this most beautiful part of the creation without reluctance. These splendid inhabitants of air possess all those qualities that can sooth the heart and cheer the fancy. The brightest colours, the roundest forms, the most active manners, and the sweetest music. In sending the imagination in pursuit
of

of these, in following them to the chirruping grove, the screaming precipice, or the glassy deep, the mind naturally lost the sense of its own situation, and, attentive to their little sports, almost forgot the Task of describing them. Innocently to amuse the imagination in this dream of life is wisdom; and nothing is useless that, by furnishing mental employment, keeps us for a while in oblivion of those stronger appetites that lead to evil. But every rank and state of mankind may find something to imitate in those delightful songsters, and we may not only employ the time, but mend our lives by the contemplation. From their courage in defence of their young, and their assiduity in incubation, the coward may learn to be brave, and the rash to be patient. The inviolable attachment of some to their companions may give lessons of fidelity; and the conjugal tenderness of others, be a monitor to the incontinent. Even those that are tyrants by nature never spread capricious destruction; and, unlike man, never inflict a pain but when urged by necessity.

THE
NATURAL HISTORY
OF
FISHES.

PART I.
THE CETACEOUS KIND.

THE

NATURAL HISTORY

OF

THE ISLANDS

PART I

THE CIRCULAR KIND.

12

A N
H I S T O R Y
O F
F I S H E S.

C H A P. I.

Of Fishes in General.

THE ocean is the great receptacle of fishes. It has been thought, by some, that all fish are naturally of that salt element; and that they have mounted up into fresh water, by some accidental migration. A few still swim up rivers to deposit their spawn; but of the great body of fishes, of which the size is enormous and the shoals are endless, those all keep to the sea, and would quickly expire in fresh water. In that extensive and undiscovered abode, millions reside, whose manners are a secret to us, and whose very form is unknown. The curiosity of mankind, indeed, has drawn some from

their depths, and his wants many more : with the figure of these at least he is acquainted ; but for their pursuits, migrations, societies, antipathies, pleasures, times of gestation, and manner of bringing forth, these all are hidden in the turbulent element that protects them.

The number of fish to which we have given names, and of the figure, at least, of which we know something, according to Linnæus, are above four hundred. Thus to appearance indeed the history of fish is tolerably copious ; but when we come to examine, it will be found that of the greatest part of these we know very little. Those qualities, singularities, or advantages, that render animals worth naming, still remain to be discovered. The history of fishes, therefore, has little in it entertaining : for our philosophers hitherto, instead of studying their nature, have been employed in encreasing their catalogues ; and the reader, instead of observations or facts, is presented with a long list of names, that disgust him with their barren superfluity. It must displease him to see the language of a science encreasing, while the science itself has nothing to repay the encreasing tax laid upon his memory.

Most fish offer us the same external form ; sharp at either end, and swelling in the middle ;

by which they are enabled to traverse the fluid which they inhabit, with greater celerity and ease. That peculiar shape which Nature has granted to most fishes, we endeavour to imitate in such vessels as are designed to sail with the greatest swiftness : however, the progress of a machine moved forward in the water by human contrivance, is nothing to the rapidity of an animal destined by Nature to reside there. Any of the large fish overtake a ship in full sail with great ease, play round it without effort, and outstrip it at pleasure. Every part of the body seems exerted in this dispatch ; the fins, the tail, and the motion of the whole backbone, assist progression ; and it is to that flexibility of body at which art cannot arrive, that fishes owe their great velocity.

The chief instruments in a fish's motion, are the fins ; which, in some fish, are much more numerous than in others. A fish completely fitted for sailing, is furnished with not less than two pair ; also three single fins, two above and one below. Thus equipped, it migrates with the utmost rapidity, and takes voyages of a thousand leagues in a season. But it does not always happen that such fish as have the greatest number of fins have the swiftest motion : the shark is thought to be one of the swiftest swim-

mers, yet it wants the ventral or belly fins ; the haddock does not move so swift, yet it is completely fitted for motion.

But the fins serve not only to assist the animal in progression, but in rising or sinking, in turning, or even leaping out of the water. To answer these purposes, the pectoral fins serve, like oars, to push the animal forward ; they are placed at some little distance behind the opening of the gills ; they are generally large and strong, and answer the same purposes to the fish in the water, as wings do to a bird in the air. With the help of these, and by their continued motion, the flying-fish is sometimes seen to rise out of the water, and to fly above an hundred yards ; till, fatigued with its exertions, it is obliged to sink down again. These also serve to balance the fish's head, when it is too large for the body, and keep it from tumbling prone to the bottom, as is seen in large headed fishes, when the pectoral fins are cut off. Next these are seen the ventral fins, placed toward the lower part of the body, under the belly : these are always seen to lie flat on the water, in whatever situation the fish may be ; and they serve rather to raise or depress the fish in its element, than to assist progressive motion. The dorsal fin is situated along the ridge of the back ; and serves

to keep it in equilibrio, as also to assist its progressive motion. In many fishes this is wanting ; but in all flat fishes it is very large, as the pectoral fins are proportionably small. The anal fin occupies that part of the fish which lies between the anus and the tail ; and this serves to keep the fish in its upright or vertical situation. Lastly, the tail, which in some fishes is flat, and upright in others, seems the grand instrument of motion : the fins are but all subservient to it, and give direction to its great impetus, by which the fish seems to dart forward with so much velocity. To explain all this by experiment ; a carp is taken, and put into a large vessel. The fish, in a state of repose, spreads all its fins, and seems to rest upon its pectoral and ventral fins near the bottom : if the fish folds up, for it has the power of folding, either of its pectoral fins, it inclines to the same side ; folding the right pectoral fin, the fish inclines to the right side ; folding the left fin, it inclines to that side in turn. When the fish desires to have a retrograde motion, striking with the pectoral fins, in a contrary direction, effectually produces it. If the fish desires to turn, a blow from the tail sends it about ; but if the tail strikes both ways, then the motion is progressive. In pursuance

of these observations, if the dorsal and ventral fins be cut off, the fish reels to the right and left, and endeavours to supply its loss by keeping the rest of its fins in constant employment. If the right pectoral fin be cut off, the fish leans to that side; if the ventral fin on the same side be cut away, then it loses its equilibrium entirely. When the tail is cut off, the fish loses all motion, and gives itself up to where the water impels it.

From hence it appears, that each of these instruments has a peculiar use assigned it; but, at the same time, that they all conspire to assist each other's motions. Some fish are possessed of all, whose motions are yet not the swiftest; others have but a part, and yet dart in the water with great rapidity. The number, the size, and the situation of the fins, therefore, seem rather calculated to correspond with the animal's figure, than solely to answer the purposes of promoting its speed. Where the head is large and heavy, there the pectoral fins are large, and placed forward, to keep it from oversetting. Where the head is small, or produced out into a long beak, and therefore not too heavy for the tail, the pectoral fins are small, and the ventral fins totally wanting.

As most animals that live upon land are fur-

nished with a covering to keep off the injuries of the weather, so all that live in the water are covered with a slimy glutinous matter, that, like a sheath, defends their bodies from the immediate contract of the surrounding fluid. This substance may be considered as a secretion from the pores of the animal's body; and serving, not only to defend, but to assist the fish's easy progress through the water. Beneath this, in many kinds, is found a strong covering of scales, that, like a coat of mail, defend it still more powerfully; and under that, before we come to the muscular parts of the body, an oily substance, which supplies the requisite warmth and vigour.

The fish, thus protected and fitted for motion in its natural element, seems as well furnished with the means of happiness as quadrupeds or birds; but if we come to examine its faculties more nearly, we shall find it very much their inferior. The sense of touching, which beasts and birds have in a small degree, the fish, covered up in its own coat of mail, can have but little acquaintance with.

The sense of smelling, which in beasts is so exquisite, and among birds is not wholly unknown, seems given to fishes in a very moderate proportion. It is true, that all fishes

have one or more nostrils; and even those that have not the holes perceptible without, yet have the proper formation of the bones for smelling within. But as air is the only medium we know for the distribution of odours, it cannot be supposed that these animals, residing in water, can be possessed of any power of being affected by them. If they have any perception of smells, it must be in the same manner as we distinguish by our taste; and, it is probable, the olfactory membrane in fish serves them instead of a distinguishing palate: by this they judge of substances, that, first tincturing the water with their vapours, are thus sent to the nostrils of the fish, and no doubt produce some kind of sensation. This most probably must be the use of that organ in those animals; as otherwise there would be the instruments of a sense provided for them, without any power in them of enjoyment.

As to tasting they seem to make very little distinction; the palate of most fish is hard and bony, and consequently incapable of the powers of relishing different substances. This sense among quadrupedes, who possess it in some degree, arises from the soft pliancy of the organ, and the delicacy of the skin which covers the instruments of tasting; it may be considered, in

them, as a more perfect and delicate kind of feeling : in the bony palate of fish, therefore, all powers of distinguishing are utterly taken away ; and we have accordingly often seen these voracious animals swallow the fisherman's plummet instead of the bait.

Hearing in fishes is found still more imperfect, if it be found at all. Certain it is, that anatomists have not been able to discover, except in the whale kind, the smallest traces of an organ, either within or without the head of fishes. It is true that in the centre of the brain of some fishes are found now and then some little bones, the number and situation of which are entirely accidental. These bones, Mr. Klein has supposed to constitute the organ of hearing ; but if we consider their entire dissimilitude to the bones that serve for hearing in other animals, we shall be of another opinion. The greatest number of fishes are deprived of the bones entirely : some fish have them in small numbers, and others in abundance ; yet neither testify any excellence or defect in hearing. Indeed, of what advantage would this sense be to animals that are incapable of making themselves heard ? They have no voice to communicate with each other, and consequently have no need of an organ for hearing. Mr. Gouan,

who kept some gold fishes in a vase, informs us, that, whatever noise he made, he could neither disturb nor terrify them: he hallowed as loud as he could, putting a piece of paper between his mouth and the water, to prevent the vibrations from affecting the surface, and the fishes still seemed insensible: but when the paper was removed, and the sound had its full play upon the water, the fishes seemed instantly to feel the change, and shrunk to the bottom. From this we may learn, that fishes are as deaf as they are mute; and that when they seem to hear the call of a whistle or a bell at the edge of a pond, it is rather the vibrations of the sound that affect the water, by which they are excited, than any sounds that they hear.

Seeing seems to be the sense fishes are possessed of in the greatest degree; and yet even this seems obscure, if we compare it to that of other animals. The eye, in almost all fish, is covered with the same transparent skin that covers the rest of the head; and which probably serves to defend it in the water, as they are without eye-lids. The globe is more depressed anteriorly, and is furnished behind with a muscle, which serves to lengthen or flatten it, according to the necessities of the animal. The crystalline humour, which in quadrupedes is

flat and of the shape of a button mould, in fishes is as round as a pea; or sometimes oblong, like an egg. From all this it appears, that fish are extremely near-sighted; and that, even in the water, they can see objects at a very small distance. This distance might very easily be ascertained, by comparing the refraction of bodies in the water, with that formed by a lens that is spherical. Those unskilled in mathematical calculations, will have a general idea of this, from the glasses used by near-sighted people. Those whose crystalline humour is too convex, or, in other words, too round, are always very near-sighted; and obliged to use concave glasses, to correct the imperfections of Nature. The crystalline humour of fish is so round that it is not in the power of any glasses, much less of water, to correct their vision. This crystalline humour in fishes all must have seen; being that little hard pea-like substance which is found in their eyes after boiling. In the natural state it is transparent, and not much harder than a jelly.

From all this, it appears how far fish fall behind terrestrial animals in their sensations, and consequently in their enjoyments. Even their brain, which is by some supposed to be of a size with every animal's understanding, shews

that fish are inferior even to birds in this particular. It is divided into three parts, surrounded with a whitish froth, and gives off nerves as well to the sense of sight as of smelling. In some fish it is grey, in others white; in some it is flattened, in others round; but in all extremely small compared to the bulk of an animal.

Thus Nature seems to have fitted these animals with appetites and powers of an inferior kind; and formed them for a sort of passive existence in the obscure and heavy element to which they are consigned. To preserve their own existence, and to continue it to their posterity, fill up the whole circle of their pursuits and enjoyments; to these they are impelled rather by necessity than choice, and seem mechanically excited to every fruition. Their senses are incapable of making any distinctions; but they drive forward in pursuit of whatever they can swallow, conquer, or enjoy.

A ceaseless desire of food seems to give the ruling impulse to all their motions. This appetite impels them to encounter every danger; and indeed their rapacity seems insatiable. Even when taken out of the water, and almost expiring, they greedily swallow the very bait by which they were allured to destruction.

The maw is, in general, placed next the mouth;

mouth; and though possessed of no sensible heat, is however endued with a surprising faculty of digestion. Its digestive power seems, in some measure, to encrease with the quantity of food it is supplied with; a single pike having been known to devour an hundred roaches in three days. Its faculties also are as extraordinary; for it digests not only fish, but much harder substances, prawns, crabs, and lobsters, shells, and all. These the cod or the sturgeon will not only devour, but dissolve down, though their shells are so much harder than the sides of the stomach which contains them. This amazing faculty in the cold maw of fishes has justly excited the curiosity of philosophers; and has effectually overturned the system of those, who supposed that the heat of the stomach was alone a sufficient instrument for digestion. The truth seems to be, and some experiments of the skilful Dr. Hunter seem to evince, that there is a power of animal assimilation lodged in the stomach of all creatures, which we can neither describe nor define, converting the substances they swallow into a fluid fitted for their own peculiar support. This is done neither by trituration, nor by warmth, nor by motion, nor by a dissolving fluid, nor by their united efforts; but by some principle in the stomach yet unknown, which

acts in a different manner from all kinds of artificial maceration. The meat taken into the stomach or maw is often seen, though very near being digested, still to retain its original form; and ready for a total dissolution, while it appears to the eye as yet untouched by the force of the stomach. This animal power is lodged in the maw of fishes, in a greater degree than in any other creatures; their digestive powers are quick, and their appetites ever are craving.

Yet, though fish are thus hungry, and for ever prowling, no animals can suffer the want of food for so long a time. The gold and silver fish we keep in vases seem never to want any nourishment at all; whether it be that they feed on the water-insects, too minute for our observation, or that water alone is a sufficient supply, is not evident; but they are often seen for months without apparent sustenance. Even the pike, the most voracious of fishes, will live in a pond where there is none but himself; and, what is more extraordinary, will be often found to thrive there.

Still, however, fish are of all other animals the most voracious and insatiable. Whatever any of them is able to swallow possessed of life, seems to be considered as the most desirable food. Some that have very small mouths feed

upon worms and the spawn of other fish: others, whose mouths are larger, seek larger prey; it matters not of what kind, whether of another or their own. Those with the largest mouths pursue almost every thing that has life; and often meet each other in fierce opposition, when the fish with the largest swallow comes off with the victory, and devours its antagonist.

Thus are they irritated by the continual desire of satisfying their hunger; and the life of a fish, from the smallest to the greatest, is but one scene of hostility, violence, and evasion. But the smaller fry stand no chance in the unequal combat; and their usual way of escaping, is by swimming into those shallows where the greater are unable or too heavy to pursue. There they become invaders in turn, and live upon the spawn of larger fish, which they find floating upon the surface of the water: yet there are dangers attending them in every place. Even in the shallows, the muscle, the oyster, and the scallop, lie in ambush at the bottom, with their shells open, and whatever little fish inadvertently approaches into contact, they at once close their shells upon him, and devour the imprisoned prey at their leisure.

Nor is the pursuit of fishes, like that of terrestrial animals, confined to a single region, or

to one effort : shoals of one species follow those of another through vast tracts of ocean, from the vicinity of the pole even down to the equator. Thus the cod, from the banks of Newfoundland, pursues the whiting, which flies before it even to the southern shores of Spain. The cachalot is said, in the same manner, to pursue a shoal of herrings, and to swallow thousands at a gulp.

This may be one cause of the annual migration of fishes from one part of the ocean to the other ; but there are other motives, which come in aid of this also. Fishes may be induced to change the place of their residence, for one more suited to their constitutions, or more adapted to depositing their spawn. It is remarkable that no fish are fond of very cold waters, and generally frequent those places where it is warmest. Thus, in summer, they are seen in great numbers in the shallows near the shore, where the sun has power to warm the water to the bottom ; on the contrary, in winter, they are found towards the bottom in the deep sea, for the cold of the atmosphere is not sufficiently penetrating to reach them at those great depths. Cold produces the same effect upon fresh-water fishes ; and when they are often seen dead after severe frosts, it is most probable that

they have been killed by the severity of the cold, as well as by their being excluded by the ice from air.

All fish live in the water ; yet they all stand in need of air for their support. Those of the whale kind, indeed, breathe the air in the same manner as we do, and come to the surface every two or three minutes to take a fresh inspiration : but those which continue entirely under water, are yet under a necessity of being supplied with air, or they will expire in a very few minutes. We sometimes see all the fish of a pond killed, when the ice every where covers the surface of the water, and thus keeps off the air from the subjacent fluid. If a hole be made in the ice, the fish will be seen to come all to that part, in order to take the benefit of a fresh supply. Should a carp, in a large vase of water, be placed under an air-pump, and then be deprived of its air, during the operation a number of bubbles will be seen standing upon the surface of the fish's body ; soon after the animal will appear to breathe swifter and with greater difficulty ; it will then be seen to rise towards the surface to get more air ; the bubbles on its surface begin to disappear ; the belly, that was before swollen, will then fall of a sudden, and the animal sink expiring and convulsed at the bottom.

So very necessary is air to all animals, but particularly to fish, that, as was said, they can live but a few minutes without it : yet nothing is more difficult to be accounted for, than the manner in which they obtain this necessary supply. Those who have seen a fish in the water, must remember the motion of its lips and its gills, or at least of the bones on each side that cover them. This motion in the animal is, without doubt, analogous to our breathing ; but it is not air, but water, that the fish actually sucks in and spouts out through the gills at every motion. The manner of it breathing is thus : the fish first takes a quantity of water by the mouth, which is driven to the gills ; these close and keep the water so swallowed from returning by the mouth ; while the bony covering of the gills prevents it from going through them, until the animal has drawn the proper quantity of air from the body of water thus imprisoned : then the bony covers open and give it a free passage ; by which means also the gills again are opened and admit a fresh quantity of water. Should the fish be prevented from the free play of its gills, or should the bony covers be kept from moving, by a string tied round them, the animal would soon fall into convulsions and die in a few minutes.

But though this be the general method of

explaining respiration in fishes, the difficulty remains to know what is done with this air, which the fish in this manner separates from the water. There seems no receptacle for containing it; the stomach being the chief cavity within the body, is too much filled with aliment for that purpose. There is indeed a cavity, and that a pretty large one, I mean the air bladder or swim, which may serve to contain it for vital purposes; but that our philosophers have long destined to a very different use. The use universally assigned to the air-bladder is the enabling the fish to rise or sink in the water at pleasure, as that is dilated or compressed. The use assigned by the ancients for it was to come in aid of the lungs, and to remain as a kind of store-house of air to supply the animal in its necessities. I own my attachment to this last opinion; but let us exhibit both with their proper share of evidence, and the reader must be left to determine.

The air-bladder is described as a bag filled with air, sometimes composed of one, sometimes of two, and sometimes of three divisions, situated towards the back of the fish, and opening into the maw or the gullet. Those who contend that this bag is designed for raising or depressing the fish in the water, build upon the following experiment. A carp being put into the

air-pump, and the air exhausted, the bladder is said to expand itself to such a degree, that the fish swells in an extraordinary manner till the bladder bursts, and then the fish sinks, and ever after continues to crawl at the bottom. On another occasion, the air-bladder was pricked and wounded, which let out its air; upon which the fish sunk to the bottom, and was not seen to rise after. From thence it is inferred, that the use of the air-bladder must be by swelling at the will of the animal, thus to encrease the surface of the fish's body, and thence diminishing its specific gravity, to enable it to rise to the top of the water, and keep there at pleasure. On the contrary, when the fish wants to descend, it is, say they, but to exhaust this bladder of its air; and the fish being thus rendered slimmer and heavier, consequently sinks to the bottom.

Such is the account given of the use of the air-bladder; no part of which seems to me well supported. In the first place, though nothing is more certain, than that a carp put into the air-pump will swell, yet so will a mouse or a frog; and these we know to have no air-bladders. A carp will rise to the surface: but so will all fish that want air, whether they have an air-bladder or not. The air-bladder is said to burst in the experiment; but that I deny. The

air-bladder is indeed found empty, but it has suffered no laceration, and may be distended by being blown into like any other bladder that is found. The fish after the experiment, I grant, continues to creep at the bottom; and so will all fish that are sick and wounded, which must be the case with this after such an operation. Thus these facts prove nothing, but that when the fish is killed in an air-pump the air bladder is found exhausted; and that it will naturally and necessarily be; for the drain of air by which the fish is supplied in the natural way will necessarily oblige it to make use of all its hidden stores; and, as there is a communication between the gullet and the air-bladder, the air which the latter contains will thus be obviously drawn away. But still farther, how comes the air-bladder, according to their hypothesis, to swell under the experiment of the air-pump? What is it that closes the aperture of that organ in such a manner as at last to burst it; or what necessity has the fish for dilating it to that violent degree? At most, it only wants to rise to the surface; and that the fish can easily do without so great a distention of the air-bladder. Indeed, it should rather seem, that the more the air was wanted without, the less necessity there was for its being uselessly accumulated within; and to

make the modern system consistent, the fish under the air-pump, instead of permitting its bladder to be burst, would readily give up its contents; which, upon their supposition, all can do at pleasure.

But the truth is, the fish can neither increase nor diminish the quantity of air in its air-bladder at will, no more than we can that which is contained in our stomachs. The animal has no one muscle, much less pair of muscles, for contracting or dilating this organ; its aperture is from the gullet; and what air is put into it must remain there till the necessities, and not the will, of the animal call it forth as a supply.

But, to put the matter past a doubt, many fish are furnished with an air-bladder that continually crawl at the bottom; such as the eel and the flounder; and many more are entirely without any bladder, that swim at ease in every depth; such as the anchovy and fresh-water gudgeon *. Indeed, the number of fish that want this organ is alone a sufficient proof that it is not so necessary for the purposes of swimming; and as the ventral fins, which in all fish lie flat upon the water, seem fully sufficient to keep them at all depths, I see no great occasion for this internal philosophical apparatus for

* Redi.

raising and depressing them. Upon the whole, the air-bladder seems adapted for different purposes than that of keeping the fish at different depths in the water; but whether it be to supply them with air when it is wanted from without, or for what other purpose, I will not take upon me to determine.

Hitherto we have seen fish in every respect inferior to land animals; in the simplicity of their conformation, in their senses and their enjoyments; but of that humble existence which they have been granted by nature, they have a longer term than any other class of animated nature. "Most of the disorders incident to mankind," says Bacon, "arise from the changes and alterations of the atmosphere; but fishes reside in an element little subject to change; theirs is an uniform existence; their movements are without effort, and their life without labour. Their bones also, which are united by cartilages, admit of indefinite extension; and the different sizes of animals of the same kind among fishes is very various. They still keep growing; their bodies, instead of suffering the rigidity of age, which is the cause of natural decay in land animals, still continue encreasing with fresh supplies; and as the body grows the conduits of life furnish their stores in greater abundance.

“ How long a fish that seems to have scarce
“ any bounds put to its growth continues to
“ live is not ascertained ; perhaps the life of a
“ man would not be long enough to measure
“ that of the smallest.”

There have been two methods devised for determining the age of fishes, which are more ingenious than certain ; the one is by the circles of the scales, the other by the transverse section of the back-bone. The first method is this. When a fish's scale is examined through a microscope, it will be found to consist of a number of circles, one circle within another, in some measure resembling those which appear upon the transverse section of a tree, and supposed to offer the same information. For as in trees we can tell their age by the number of their circles, so in fishes we can tell theirs by the number of circles in every scale, reckoning one ring for every year of the animal's existence. By this method, Mr. Buffon found a carp, whose scales he examined, to be not less than an hundred years old ; a thing almost incredible had we not several accounts in other authors which tend to confirm the discovery. Gesner bring us an instance of one of the same age ; and Albertus of one more than double that period.

The age of the skate and the ray, that want scales, may be known by the other method ;

which is, by separating the joints of the backbone, and then minutely observing the number of rings which the surface where it was joined exhibits. By this the fish's age is said to be known; and perhaps with as much certainty as in the former instance.

But how unsatisfactory soever these marks may be, we have no reason to doubt the great age of some fishes. Those that have ponds often know the oldest by their superior size. But the longevity of these animals is nothing when compared to their fecundity. All sorts, a few of the larger ones excepted, multiply their kind some by hundreds and some by millions. There are some that bring forth their young alive, and some that only produce eggs: the former are rather the least fruitful: yet even these are seen to produce in great abundance. The viviparous blenny, for instance, brings forth two or three hundred at a time, all alive and playing round the parent together. Those who exclude their progeny in a more imperfect state, and produce eggs, which they are obliged to leave to chance, either on the bottom at the edge of the water, or floating on the surface where it is deeper, are all much more prolific; and seem to proportion their stock to the danger there is of its consumption. Of

these eggs thus deposited, scarce one in an hundred brings forth an animal ; they are devoured by all the lesser fry that frequent the shores ; by aquatic birds near the margin, and by the larger fish in deep water. Still, however, there are enough for supplying the deep with inhabitants ; and, notwithstanding their own rapacity and that of the fowls of various tribes, the numbers that escape are sufficient to relieve the wants of a very considerable part of mankind. Indeed, when we consider the numbers that a single fish is capable of producing, the amount will seem astonishing. If, for instance, we should be told of a being so very prolific, that in a single season it could bring forth as many of its kind as there are inhabitants in England, it would strike us with surprize ; yet a single cod produces full that number. The cod spawns in one season, as Lewenhoeck assures us, above nine million of eggs or peas contained in one single roe. The flounder is commonly known to produce above one million ; and the mackarel above five hundred thousand. Such an amazing encrease, if permitted to come to maturity, would overstock nature, and even the ocean itself would not be able to contain, much less to provide for, the half of its inhabitants. But two wise purposes are answered by this amazing encrease ; it preserves the species

in the midst of numberless enemies, and serves to furnish the rest with a sustenance adapted to their nature.

Fishes seem, all except the whale kind, entirely divested of those parental solitudes which so strongly mark the manner of the more perfect terrestrial animals. How far they copulate remains as yet a doubt; for though they seem to join, yet the male is not furnished with any external instrument of generation. It is said, by some, that his only end in that action is to emit his impregnating milt upon the eggs that at that time fall from the female. He is said to be seen pursuing them as they float down the stream, and carefully impregnating them one after another. On some occasions also the females dig holes in the bottom of rivers and ponds, and there deposit their spawn, which is impregnated by the male in the same manner. All this, however, is very doubtful; what we know with certainty of the matter, and that not discovered till very lately, is, that the male has two organs of generation that open into the bladder of urine, and that these organs do not open into the rectum as in birds, but have a particular aperture of their own*. These organs of generation in the male are empty at some seasons of the year; but before

* Vide Gaman de Generatione Piscium.

the time of spawning they are turgid with what is called the milt, and emit the fluid proper for impregnation.

Fish have different seasons for depositing their spawn: some, that live in the depths of the ocean, are said to chuse the winter months; but, in general, those with which we are acquainted, chuse the hottest months in summer, and prefer such water as is somewhat tepefied by the beams of the sun. They then leave the deepest parts of the ocean, which are the coldest, and shoal round the coasts, or swim up the fresh-water rivers, which are warm as they are comparatively shallow. When they have deposited their burthens, they then return to their old stations, and leave their nascent progeny to shift for themselves.

The spawn continues in its egg-state in some fish longer than in others, and this in proportion to the animal's size. In the salmon, for instance, the young animal continues in the egg from the beginning of December till the beginning of April; the carp continues in the egg not above three weeks; the little gold-fish from China is produced still quicker. These all, when excluded, at first escape by their minuteness and agility. They rise, sink, and turn much readier than grown fish;

fish; and they can escape into very shallow waters when pursued. But, with all their advantages, scarce one in a thousand survives the numerous perils of its youth. The very male and female that have given them birth, are equally dangerous and formidable with the rest, forgetting all relation at their departure.

Such is the general picture of these heedless and hungry creatures: but there are some in this class, living in the waters, that are possessed of finer organs and higher sensations; that have all the tenderness of birds or quadrupeds for their young; that nurse them with constant care, and protect them from every injury. Of this class are the *Cetaceous* tribe, or the fishes of the whale kind. There are others, though not capable of nursing their young, yet that bring them alive into the world, and defend them with courage and activity. These are the *Cartilaginous* kinds, or those who have gristles instead of bones. But the fierce unmindful tribe we have been describing, that leave their spawn without any protection, are called the *Spinous* or bony kinds, from their bones resembling the sharpness of thorns.

Thus there are three grand divisions in the fish kind: the *cetaceous*, the *cartilaginous*, and the *spinous*; all differing from each other in

their conformation, their appetites, in their bringing forth, and in the education of their young. These three great distinctions are not the capricious differences formed by a maker of systems, but are strongly and firmly marked in nature. These are the distinctions of Aristotle; and they have been adopted by mankind ever since his time. It will be necessary, therefore, to give the history of each of these in particular; and then to range under each head, those fishes whose history is the most remarkable; or, more properly speaking, those of which we have any history. For we shall find, when we come to any of the species in particular, how little can be said of their habits, their stations, or method of propagation.

Much, indeed, can be said of them, if considered relatively to man; and large books have been written of the manner of taking fish; or of dressing them. Apicius is noted for having first taught mankind to suffocate fish in Carthaginian pickle; and Quin for giving a sauce to the Johndore; Mrs. Glasse is famous for her eel pie, and Mr. Tull for his invention of spaying carp to give it a finer flavour. In this manner our cooks handle the subject. On the other hand our physicians assure us that the flesh of fishes yields little nourishment, and soon cor-

rupts; that it abounds in a gross sort of oil and water, and hath but few volatile particles, which renders it less fit to be converted into the substance of our bodies. They are cold and moist, and must needs, say they, produce juices of the same kind, and consequently are improper to strengthen the body. In this diversity of opinion, it is the wisest way to eat our fish in the ordinary manner, and pay no great attention to cooks or doctors.

I cannot conclude this chapter without putting a question to the learned, which, I confess, I am not able to resolve. How comes it that fish, which are bred in a salt element, have yet no salt to the taste, or that is capable of being extracted from it?

C H A P. II.

Of Cetaceous Fishes in general.

AS on land there are some orders of animals that seem formed to command the rest, with greater powers and more various instincts, so in the ocean there are fishes which seem formed upon a nobler plan than others, and that, to their fishy form, join the appetites and the conformation of quadrupedes. - These all are of the *cetaceous* kind; and so much raised above their fellows of the deep, in their appetites and instincts, that almost all our modern naturalists have fairly excluded them from the finny tribes, and will have them called, not fishes, but, great beasts of the ocean. With them it would be as improper to say men go to Greenland fishing for whale, as it would be to say that a sportsman goes to Blackwall a fowling for mackarel.

Yet, notwithstanding philosophers, mankind will always have their own way of talking; and, for my own part, I think them here in the right. A different formation of the lungs, stomach, and intestines, a different manner of breathing or propagating, are not sufficient to counterbalance the great obvious analogy which

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these animals bear to the whole finny tribe. They are shaped as other fishes; they swim with fins; they are entirely naked, without hair; they live in the water, though they come up to breathe; they are only seen in the depths of the ocean, and never come upon shore but when forced thither. These sure are sufficient to plead in favour of the general denomination, and acquit mankind of error in ranking them with their lower companions of the deep.

But still they are as many degrees raised above other fishes in their nature, as they are in general in their size. This tribe is composed of the Whale and its varieties, of the Cachalot, the Dolphin, the Grampus, and the Porpoise. All these resemble quadrupedes in their internal structure, and in some of their appetites and affections. Like quadrupedes, they have lungs, a midriff, a stomach, intestines, liver, spleen, bladder, and parts of generation; their heart also resembles that of quadrupedes, with its partitions closed up as in them, and driving red and warm blood in circulation through the body. In short, every internal part bears a most striking similitude; and to keep these parts warm, the whole kind are also covered between the skin and the muscles with a thick coat of fat or blubber, which, like the bacon-fat of an hog,

keeps out the cold, renders their muscles glib and pliant, and probably makes them lighter in swimming.

As these animals breathe the air, it is obvious that they cannot bear to be any long time under water. They are constrained, therefore, every two or three minutes, to come up to the surface to take breath, as well as to spout out through their nostril, for they have but one, that water which they sucked in while gaping for their prey. This conduit, by which they breathe, and also throw out the water, is placed in the head, a little before the brain. Though externally the hole is but single, it is internally divided by a bony partition, which is closed by a sphincter muscle on the inside, that, like the mouth of a purse, shuts it up at the pleasure of the animal. There is also another muscle or valve, which prevents the water from going down the gullet. When therefore the animal takes in a certain quantity of water, which is necessary to be discharged and separated from its food, it shuts the mouth, closes the valve of the stomach, opens the sphincter that kept the nostril closed, and then breathing strongly from the lungs, pushes the water out by the effort, as we see it rise by the pressure of air in a fire-engine.

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The senses of these animals seem also superior to those of other fishes. The eyes of other fishes, we have observed, are covered only with that transparent skin that covers the rest of the head; but in all the cetaceous kinds, it is covered by eye-lids, as in man. This, no doubt, keeps that organ in a more perfect state, by giving it intervals of relaxation, in which all vision is suspended. The other fishes, that are for ever staring, must see, if for no other reason, more feebly, as their organs of sight are always exerted.

As for hearing, these also are furnished with the internal instruments of the ear, although the external orifice no where appears. It is most probable that this orifice may open by some canal, resembling the Eustachian tube, into the mouth; but this has not as yet been discovered.

Yet Nature sure has not thus formed a complete apparatus for hearing, and denied the animal the use of it when formed. It is most likely that all animals of the cetaceous kind can hear, as they certainly utter sounds, and bellow to each other. This vocal power would be as needless to animals naturally deaf, as glasses to a man that was blind.

But it is in the circumstances in which they continue their kind, that these animals shew an

eminent superiority. Other fish deposit their spawn, and leave the success to accident: these never produce above one young, or two at the most; and this the female suckles entirely in the manner of quadrupedes, her breasts being placed, as in the human kind, above the navel. We have read many fabulous accounts of the nursing of the demigods of antiquity, of their feeding on the marrow of lions, and their being suckled by wolves; one might imagine a still more heroic system of nutrition, if we supposed that the young hero was suckled and grew strong upon the breast-milk of a she-whale.

The whale or the grampus are terrible at any time; but are fierce and desperate in the defence of their young. In Waller's beautiful poem of the Summer Islands, we have a story, founded upon fact, which shews the maternal tenderness of these animals for their offspring. A whale and her cub had got into an arm of the sea, where, by the desertion of the tide, they were enclosed on every side. The people from shore soon saw their situation, and drove down upon them in boats, with such weapons as the urgent occasion offered. The two animals were soon wounded in several places, and the whole sea round was tinged with their blood. The whales made several attempts to escape; and at last the old one,

by its superior strength, forced over the shallow, into the depths of the ocean. But though in safety herself, she could not bear the danger that awaited her young one; she therefore rushed in once more where the smaller animal was imprisoned, and resolved, when she could not protect, at least to share his danger.—The story ends with poetical justice; for the tide coming in, brought off both in safety from their enemies, though not without sustaining an infinite number of wounds in every part.

As to the rest, the distinctive marks of this tribe are, that the number of their fins never exceeds three; namely, two pectoral fins, and one back fin; but in some sorts the last is wanting. These fins differ very much from those of other fishes, which are formed of straight spines: the fins of the cetaceous tribe are made up of bones and muscles; and the skeleton of one of their fins, very much resembles the skeleton of a man's hand. Their tails also are different from those of all other fish: they are placed so as to lie flat on the surface of the water; while the other kinds have them, as we every day see, upright or edgeways. This flat position of the tail in cetaceous animals, enables them to force themselves suddenly to the surface of the water to breathe, which they are continually constrained to do.

Of these enormous animals, some are without teeth, and properly called whales; others have the teeth only in the lower jaw, and are called, by the French, cachalots: the narwhal has teeth only in the upper jaw: the dolphin's teeth, as well as those of the porpesse and grampus, are both above and below. These are the marks that serve to distinguish the kinds of this enormous tribe from each other; and these shall serve to guide us, in giving their history.

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C H A P. III.

Of the Whale, properly so called, and its Varieties.

IF we compare land animals, in respect to magnitude, with those of the deep, they will appear contemptible in the competition. It is probable, indeed, that quadrupedes once existed much larger than we find them at present. From the skeletons of some that have been dug up at different times, it is evident, that there must have been terrestrial animals twice as large as the elephant; but creatures of such an immense bulk required a proportionable extent of ground for subsistence, and, by being rivals with men for large territory, they must have been destroyed in the contest.

But it is not only upon land that man has exerted his power of destroying the larger tribes of animated nature; he has extended his efforts even in the midst of the ocean, and has cut off numbers of those enormous animals that had perhaps existed for ages. We now no longer hear of whales two hundred, and two hundred and fifty, feet long, which we are certain were often seen about two centuries ago. They have all

been destroyed by the skill of mankind, and the species is now dwindled into a race of diminutive animals, from thirty to about eighty feet long.

The northern seas were once the region to which the greatest of these animals resorted; but so great has been the slaughter of whales for more than two ages, that they begin to grow thinner every day; and those that are found there, seem, from their size, not come to their full dimensions. The greatest whales resort to places where they have the least disturbance; to those seas that are on the opposite side of the globe, near the south pole. In that part of the world, there are still to be seen whales that are above an hundred and sixty feet long; and perhaps even longer might be found in those latitudes near the south pole, to which we have not as yet ventured.

Taking the whale, however, at the ordinary size of eighty feet long and twenty feet high, what an enormous animated mass must it appear to the spectator! With what amazement must it strike him, to behold so great a creature gambolling in the deep, with the ease and agility of the smallest animal, and making its way with incredible swiftness! This is a sight which is very common to those who frequent the northern or

southern ocean. Yet though this be wonderful, perhaps still greater wonders are concealed in the deep, which we have not had opportunities of exploring. These large animals are obliged to shew themselves in order to take breath; but who knows the size of those that are fitted to remain for ever under water, and that have been encreasing in magnitude for centuries? To believe all that has been said of the sea-serpent, or the Kraken, would be credulity; to reject the possibility of their existence, would be presumption.

The Whale is the largest animal of which we have any certain information; and the various purposes to which, when taken, its different parts are converted, have brought us tolerably acquainted with its history. Of the whale, properly so called, there are no less than seven different kinds; all distinguished from each other by their external figure, or internal conformation. The Great Greenland Whale, without a back-fin, and black on the back; the Iceland Whale, without a back-fin, and whitish on the back; the New England Whale, with a hump on the back; the Whale with six humps on the back; the Fin-fish, with a fin on the back near the tail; the Pike-headed Whale, and the Round-lipped Whale. All these differ

from each other in figure, as their names obviously imply. They differ also somewhat in their manner of living; the fin-fish having a larger swallow than the rest, being more active, slender, and fierce, and living chiefly upon herrings. However, they are none of them very voracious; and, if compared to the Cachalot, that enormous tyrant of the deep, they appear harmless and gentle. The history of the rest, therefore, may be comprised under that of the Great Common Greenland Whale, with which we are best acquainted.

The Great Greenland Whale is the fish for taking which there are such preparations made in different parts of Europe. It is a large heavy animal, and the head alone makes a third of its bulk. It is usually found from sixty to seventy feet long. The fins on each side are from five to eight feet, composed of bones and muscles, and sufficiently strong to give the great mass of body which they move, speed and activity. The tail, which lies flat on the water, is about twenty-four feet broad; and, when the fish lies on one side, its blow is tremendous. The skin is smooth and black, and, in some places, marbled with white and yellow; which, running over the surface, has a very beautiful effect. This marbling is particularly observable in the fins and the tail. In

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the figures which are thus drawn by Nature, fancy often forms the pictures of trees, landscapes and houses. In the tail of one that was thus marbled, Ray tells us that the number 122 was figured very evenly and exact, as if done with a pencil.

The whale makes use only of the tail to advance itself forward in the water. This serves as a great oar to push its mass along; and it is surprising to see with what force and celerity its enormous bulk cuts through the ocean. The fins are only made use of for turning in the water, and giving a direction to the velocity impressed by the tail. The female also makes use of them, when pursued, to bear off her young, clapping them on her back, and supporting them by the fins on each side from falling.

The outward or scarf skin of the whale is no thicker than parchment; but this removed, the real skin appears, of about an inch thick, and covering the fat or blubber that lies beneath: this is from eight to twelve inches in thickness; and is, when the fish is in health, of a beautiful yellow. The muscles lie beneath; and these, like the flesh of quadrupedes, are very red and tough.

The cleft of the mouth is above twenty feet

long, which is near one third of the animal's whole length; and the upper jaw is furnished with barbs, that lie, like the pipes of an organ, the greatest in the middle, and the smallest to the sides. These compose the whale-bone; the longest spars of which are found to be not less than eighteen feet: the shortest, being of no value, are thrown away. The tongue is almost immovably fixed to the lower jaw, seeming one great lump of fat; and, in fact, it fills several hogheads with blubber. The eyes are not larger than those of an ox; and when the crystalline humour is dried, it does not appear larger than a pea. They are placed towards the back of the head, being the most convenient situation for enabling them to see both before and behind; as also to see over them, where their food is principally found. They are guarded by eye-lids and eye-lashes, as in quadrupedes; and they seem to be very sharp-sighted.

Nor is their sense of hearing in less perfection; for they are warned, at great distances, of any danger preparing against them. It would seem as if Nature had designedly given them these advantages, as they multiply little, in order to continue their kind. It is true, indeed, that the external organ of hearing is not perceptible,

ceptible, for this might only embarrass them in their natural element; but as soon as the thin scarf-skin above mentioned is removed, a black spot is discovered behind the eye, and under that is the auditory canal, that leads to a regular apparatus for hearing. In short, the animal hears the smallest sounds at very great distances, and at all times, except when it is spouting water; which is the time that the fishers approach to strike it.

These spout-holes or nostrils, in all the cetaceous tribe, have been already described: in this whale they are two; one on each side the head before the eyes, and crooked, somewhat like the holes on the belly of a violin. From these holes this animal blows the water very fiercely, and with such a noise that it roars like a hollow wind, and may be heard at three miles distance. When wounded, it then blows more fiercely than ever, so that it sounds like the roaring of the sea in a great storm.

We have already observed, that the substance called whalebone, is taken from the upper jaw of the animal, and is very different from the real bones of the whale. The real bones are hard, like those of great land animals, are very porous, and filled with marrow. Two great strong bones sustain the under lip, lying against

each other in the shape of an half-moon : some of these are twenty feet long ; they are seen in several gardens set up against each other, and are usually mistaken for the ribs of this animal.

Such is the general conformation and figure of this great inhabitant of the deep, the precise anatomy of which has not been yet ascertained. In those places where they are caught in greatest abundance, the sailors are not very curious as to the structure of the viscera ; and few anatomists care to undertake a task, where the operator, instead of separating with a lancet, must cut his way with an ax. It is as yet doubted, therefore, whether the whale, that in most points internally resembles a quadrupede, may not have one great bowel fitted entirely for the reception of air, to supply it, when constrained to keep longer than usual at the bottom. The sailors universally affirm that it has ; and philosophers have nothing but the analogy of its parts to oppose to their general assertions.

As these animals resemble quadrupedes in conformation, so they bear a strong resemblance in some of their appetites and manners. The female joins with the male, as it is asserted, *more humano*, and once in two years feels the accesses of desire.

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Their fidelity to each other exceeds whatever we are told of even the constancy of birds. Some fishers, as Anderson informs us, having struck one of two whales, a male and a female, that were in company together, the wounded fish made a long and terrible resistance: it struck down a boat with three men in it, with a single blow of the tail, by which all went to the bottom. The other still attended its companion, and lent it every assistance; till, at last, the fish that was struck, sunk under the number of its wounds; while its faithful associate, disdaining to survive the loss, with great bellowing, stretched itself upon the dead fish, and shared his fate.

The whale goes with young nine or ten months, and is then fatter than usual, particularly when near the time of bringing forth. It is said that the embryo, when first perceptible, is about seventeen inches long, and white; but the cub, when excluded, is black, and about ten feet long. She generally produces one young one, and never above two. When she suckles her young, she throws herself on one side on the surface of the sea, and the young one attaches itself to the teat. The breasts are two; generally hid within the belly; but she

can produce them at pleasure, so as to stand forward a foot and an half, or two feet; and the teats are like those of a cow. In some, the breasts are white; in others, speckled; in all, filled with a large quantity of milk, resembling that of land animals.

Nothing can exceed the tenderness of the female for her offspring; she carries it with her wherever she goes, and, when hardest pursued, keeps it supported between her fins. Even when wounded, she still clasps her young one; and when she plunges to avoid danger, takes it to the bottom; but rises sooner than usual, to give it breath again.

The young ones continue at the breast for a year; during which time they are called by the sailors *short-heads*. They are then extremely fat, and yield above fifty barrels of blubber. The mother, at the same time, is equally lean and emaciated. At the age of two years they are called *stunts*, as they do not thrive much immediately after quitting the breast: they then yield scarce above twenty, or twenty-four, barrels of blubber: from that time forward they are called *skull-fish*, and their age is wholly unknown.

Every species of whale propagates only with those of its own kind, and does not at all min-

gle with the rest: however, they are generally seen in shoals, of different kinds together, and make their migrations in large companies, from one ocean to an other. They are a gregarious animal, which implies their want of mutual defence against the invasions of smaller, but more powerful, fishes. It seems astonishing, therefore, how a shoal of these enormous animals find subsistence together, when it would seem that the supplying even one with food would require greater plenty than the ocean could furnish. To encrease our wonder, we not only see them herding together, but usually find them fatter than any other animals of whatsoever element. We likewise know that they cannot swallow large fishes, as their throat is so narrow, that an animal larger than an herring could not enter. How then do they subsist and grow so fat? A small insect which is seen floating in those seas, and which Linnæus terms the Medusa, is sufficient for this supply. These insects are black, and of the size of a small bean, and are sometimes seen floating in clusters on the surface of the water. They are of a round form, like snails in a box, but they have wings, which are so tender that it is scarce possible to touch them without breaking. These serve rather for swimming than flying; and the little

animal is called by the Icelanders, the Walfishchoas, which signifies the whale's provender. They have the taste of raw muscles, and have the smell of burnt sugar. These are the food of the whale, which it is seen to draw up in great numbers with its huge jaws, and to bruise between its barbs, which are always found with several of these sticking among them.

This is the simple food of the great Greenland whale; it pursues no other animal, leads an inoffensive life in its element, and is harmless in proportion to its strength to do mischief. There seems to be an analogy between its manners and those of the elephant. They are both the strongest and the largest animals in their respective elements; neither offer injury, but are terrible when provoked to resentment. The fin-fish indeed, in some measure, differs from the great whale in this particular, as it subsists chiefly upon herrings, great shoals of which it is often seen driving before it. Yet even the swallow of this fish is not very large, if compared to the cachalot tribe; and its ravages are but sports in comparison. The stomach and intestines of all these animals, when opened, seldom have any thing in them, except a soft unctuous substance, of a brownish colour; and their excrements are of a shining red.

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As the whale is an inoffensive animal, it is not to be wondered that it has many enemies, willing to take advantage of its disposition, and inaptitude for combat. There is a small animal, of the shell-fish kind, called the Whale-louse, that sticks to its body, as we see shells sticking to the foul bottom of a ship. This insinuates itself chiefly under the fins; and whatever efforts the great animal makes, it still keeps its hold, and lives upon the fat, which it is provided with instruments to arrive at.

The sword-fish, however, is the whale's most terrible enemy. "At the sight of this little animal," says Anderson, "the whale seems agitated in an extraordinary manner; leaping from the water as if with affright: wherever it appears, the whale perceives it at a distance, and flies from it in the opposite direction. I have been myself," continues he, "a spectator of their terrible encounter. The whale has no instrument of defence except the tail; with that it endeavours to strike the enemy; and a single blow taking place, would effectually destroy its adversary: but the sword-fish is as active as the other is strong, and easily avoids the stroke; then bounding into the air, it falls upon its great subjacent enemy, and endea-

“vours, not to pierce with its pointed beak,
“but to cut with its roothed edges. The sea
“all about is soon dyed with blood, proceeding
“from the wounds of the whale; while the
“enormous animal vainly endeavours to reach
“its invader, and strikes with its tail against the
“surface of the water, making a report at each
“blow louder than the noise of a cannon.”

There is still another and more powerful enemy called, by the fishermen of New England, the Killer. This is itself a cetaceous animal, armed with strong and powerful teeth. A number of these are said to surround the whale, in the same manner as dogs get round a bull. Some attack it with their teeth behind; others attempt it before; until, at last, the great animal is torn down, and its tongue is said to be the only part they devour when they have made it their prey. They are said to be of such great strength, that one of them alone was known to stop a dead whale that several boats were towing along, and drag it from among them to the bottom.

But of all the enemies of these enormous fishes, man is the greatest: he alone destroys more in a year than the rest in an age, and actually has thinned their numbers in that part of the world where they are chiefly sought. The great resort of these animals was found to be

on the inhospitable shores of Spitzbergen; where the distance of the voyage, the coldness of the climate, the terrors of the icy sea, and, still more, their own formidable bulk, might have been expected to protect them from human injury. But all these were but slight barriers against man's arts, his courage, and his necessities. The European ships, soon after the improvement of navigation, found the way into those seas; and as early as the beginning of the fourteenth century, the Biscayneers were in possession of a very considerable trade to the coasts of Greenland. The Dutch and the English followed them thither, and soon took that branch of commerce out of their hands. The English commenced the business about the beginning of the seventeenth century; and the town of Hull had the honour of first attempting that profitable branch of trade. But, at present, it seems upon the decline, as the quantity of fish are so greatly reduced, by the constant capture for such a vast length of time. It was now said, that the fishers, from a defect of whales, apply themselves to the seal-fishery; yet, as these animals are extremely timorous, they will soon be induced to quit those shores, where they meet such frequent disturbance and danger. The poor natives of Greenland themselves, who used to feed upon

the whale, are diminishing, in proportion as their sustenance is removed; and, it is probable, that the revolution of a few years will see that extensive coast totally deserted by its inhabitants, as it is already nearly deserted by the whales.

The art of taking whales, like most others, is much improved by time, and differs in many respects from that practised by the Biscayneers, when they first frequented the icy sea. But as the description of their methods is the least complicated, and consequently the easiest understood, it will be best suited to our purpose.

For this navigation, the Biscayneers, in favourable seasons, fitted out thirty ships, of two hundred and fifty tons each, with fifty choice men a-piece, and a few boys. These were stored with six months provision; and each ship had its boats, which were to be serviceable when come to the place of duty. When arrived at the part where the whales are expected to pass to the southward, they always keep their sails set, and a sailor is placed at the mast-head, to give information when he spies a whale. As soon as he discovers one, the whole crew are instantly in employment: they fit out their boats, and row away to where the whale was seen. The harpooner, who is to strike the fish, stands at the prow of the boat, with an harpoon

or javelin in his hand, five or six feet long, pointed with steel like the barb of an arrow, of a triangular shape. As this person's place is that of the greatest dexterity, so also it is of the greatest danger: the whale sometimes overturns the boat with a blow of its tail, and sometimes drives against it with fury. In general, however, the animal seems to sleep on the surface of the water; while the boat approaching, the harpooner stands aloft, and, with his harpoon tied to a cord of several hundred fathom length, darts it into the animal, and then rows as fast as possible away. It is some time before the whale seems to feel the blow; the instrument has usually pierced no deeper than the fat, and that being insensible, the animal continues for a while motionless; but soon roused from its seeming lethargy, as the shaft continues to pierce deeper and deeper into the muscular flesh, it flies off with amazing rapidity. In the mean time, the harpoon sticks in its side; while the rope, which is coiled up in the boat, and runs upon a swivel, lengthens as the whale recedes, but still shews the part of the deep to which it has retreated. The cord is coiled up with great care; for such is the rapidity with which it runs off, that if it was but the least checked, as it yields with the animal's retreat,

it would infallibly overfet the boat, and the crew would go to the bottom. It sometimes happens alfo, that the rapidity with which it runs over the fwivel at the edge of the boat, beats it, and it would infallibly take fire, did not a man ftand continually with a wet mop in his hand, to cool the fwivel as the cord runs. The whale having dived to a confiderable depth, remains at the bottom, sometimes for near half an hour, with the harpoon in its body, and then rifes to take breath, expecting the danger over: but the instant it appears, they are all with their boats ready to receive it, and fling their harpoons into its body: the animal again dives and again rifes, while they repeat their blows. The fhip follows in full fail, like all the reft, never lofing fight of the boats, and ready to lend them affiftance; the whole ocean feems dyed in blood. Thus they renew their attack, till the whale begins to be quite enfeebled and fpent, when they plunge their longer fpears into various parts of its body, and the enormous animal expires. When it is dead, to prevent it from finking, they tie it with a ftrong iron chain to the fide of the boat, and either cut it up in pieces, and carry it home in that manner, or extract the oil from the blubber on fhip-board.

Such is the manner in which these fish were taken in the beginning; but succeeding arts have improved the method, and the harpoon is now thrown by : a machine being used which inflicts a deeper wound, and strikes the animal with much greater certainty : there are better methods for extracting the oil, and properer machines for cutting the animal up, than were used in the early fisheries. But as an account of this belongs to the history of art, and not of nature, we must be contented with observing, that several parts of this animal, and all but the intestines and the bones, are turned to very good account ; not only the oil, but the greaves from which it is separated. The barbs also were an article of great profit ; but have sunk in their price since women no longer use them to swell out their petticoats with whalebone. The flesh of this animal is also a dainty to some nations ; and even the French seamen are now and then found to dress and use it as their ordinary diet at sea. It is said, by the English and Dutch sailors, to be hard and ill-tasted ; but the French assert the contrary ; and the savages of Greenland, as well as those near the south pole, are fond of it to distraction. They eat the flesh, and drink the oil, which is a first-rate delicacy.

The finding a dead whale is an adventure considered among the fortunate circumstances of their wretched lives. They make their abode beside it; and seldom remove till they have left nothing but the bones.

Jacobson, whom we quoted before in the History of Birds, where he describes his countrymen of the island of Feroe as living a part of the year upon salted gulls, tells us also, that they are very fond of salted whale's flesh. The fat of the head they season with bay salt, and then hang it up to dry in the chimney. He thinks it tastes as well as fat bacon; and the lean, which they boil, is, in his opinion, not inferior to beef. I fancy poor Jacobson would make but an indifferent taster at one of our city feasts!

C H A P. IV.

Of the Narwhal.

FROM whales that entirely want teeth, we come to such as have them in the upper jaw only; and in this class there is found but one, the Narwhal, or Sea-unicorn. This fish is not so large as the whale, not being above sixty feet long. Its body is slenderer than that of the whale, and its fat not in so great abundance. But this great animal is sufficiently distinguished from all others of the deep by its tooth or teeth, which stand pointing directly forward from the upper jaw, and are from nine to fourteen feet long. In all the variety of weapons with which Nature has armed her various tribes, there is not one so large or so formidable as this. This terrible weapon is generally found single; and some are of opinion that the animal is furnished but with one by nature; but there is at present the skull of a narwhal at the Stadthouse at Amsterdam with two teeth; which plainly proves that in some animals, at least, this instrument is double. It is even a doubt whether it may not be so in all; and that the narwhal's

wanting a tooth is only an accident which it has met with in the encounters it is obliged daily to be engaged in. Yet it must be owned of these that are taken only with one tooth, there seems no socket nor no remains of any other upon the opposite side of the jaw, but all is plain and even. However this be, the tooth, or, as some are pleased to call it, the horn of the narwhal is the most terrible of all natural instruments of destruction. It is as straight as an arrow, about the thickness of the small of a man's leg, wreathed in the manner we sometimes see twisted bars of iron; it tapers to a sharp point; and is whiter, heavier, and harder than ivory. It is generally seen to spring from the left side of the head directly forward in a straight line with the body; and its root enters into the socket above a foot and an half. In a skull to be seen at Hamburgh there are two teeth, which are each above seven feet long, and are eight inches in circumference. When the animal possessed of these formidable weapons is urged to employ them, it drives directly forward against the enemy with its teeth, that, like protended spears, pierce whatever stands before them.

The extreme length of these instruments have induced some to consider them rather as

horns than teeth; but they in every respect resemble the tusks of the boar and the elephant. They grow, as in them, from sockets in the upper jaw; they have the solidity of the hardest bone, and far surpass ivory in all its qualities. The same error has led others to suppose, that as among quadrupedes the female was often found without horns, so these instruments of defence were only to be found in the male; but this has been more than once refuted by actual experience; both sexes are found armed in this manner; the horn is sometimes found wreathed and sometimes smooth; sometimes a little bent and sometimes straight; but always strong, deeply fixed, and sharply pointed.

Yet, notwithstanding all these appointments for combat, these long and pointed tusks, amazing strength, and unmatchable celerity, the narwhal is one of the most harmless and peaceful inhabitants of the ocean. It is seen constantly and inoffensively sporting among the other great monsters of the deep, no way attempting to injure them, but pleased in their company. The Greenlanders call the narwhal the fore-runner of the whale; for wherever it is seen, the whale is shortly after sure to follow. This may arise as well from the natural passion for society in these animals as from both living

upon the same food, which are the insects described in the preceding chapter. These powerful fishes make war upon no other living creature; and, though furnished with instruments to spread general destruction, are as innocent and as peaceful as a drove of oxen. Nay, so regardless are they of their own weapons, and so utterly unmindful to keep them in repair for engagement, that they are constantly seen covered over with weeds, slough, and all the filth of the sea; they seem rather considered as an impediment than a defence.

The manners and appetites both of the narwhal and the great whale are entirely similar; they both alike want teeth for chewing, and are obliged to live upon insects; they both are peaceable and harmless, and always rather fly than seek the combat. The narwhal, however, has a much narrower gape than the great whale, and therefore does not want the use of barbs to keep in its food when once sucked into the mouth. It is also much swifter, and would never be taken by the fisherman but for those very tusks, which at first appear to be its principal defence. These animals, as was said, being fond of living together, are always seen in herds of several at a time; and whenever they are attacked, they crowd together in such a manner,

that they are mutually embarrassed by their tusks. By these they are often locked together, and are prevented from sinking to the bottom. It seldom happens, therefore, but the fishermen make sure of one or two of the hindmost, which very well reward their trouble.

It is from the extraordinary circumstance of the teeth, therefore, that this fish demands a distinct history; and such has been the curiosity of mankind, and their desire to procure them, that a century ago they were considered as the greatest rarity in the world. At that time the art of catching whales was not known; and mankind saw few, except such as were stranded on the coasts by accident. The tooth of the narwhal, therefore, was ascribed to a very different animal from that which really bore it. Among other fossil substances they were sometimes dug up; and the narwhal being utterly unknown, naturalists soon found a terrestrial owner. They were thought to be the horns of unicorns, an animal described by Pliny as resembling an horse, and with one straight horn darting forward from the middle of its forehead. These teeth were, therefore, considered as a strong testimony in favour of that historian's veracity, and were shewn among the most precious remains of antiquity. Even for some

time after the narwhal was known, the deceit was continued, as those who were possessed of a tooth sold it to great advantage. But at present they are too well known to deceive any, and are only shewn for what they really are; their curiosity encreasing in proportion to their weight and their size.

CHAP. V.

Of the Cachalot and its Varieties.

THE Cachalot, which has generally gone under the name of the Spermaceti Whale, till Mr. Pennant very properly made the distinction, by borrowing its name from the French, has several teeth in the under jaw, but none in the upper. As there are no less than seven distinctions among whales, so also there are the same number of distinctions in the tribe we are describing. The cachalot with two fins and a black back; the cachalot with two fins and a whitish back; that with a spout in the neck; that with the spout in the snout; that with three fins and sharp-pointed teeth; that with three fins and sharp-edged teeth; and lastly, the cachalot with three fins and flatted teeth.

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The tribe is not of such enormous size as the whale, properly so called, not being above sixty feet long and sixteen feet high. In consequence of their being more slender, they are much more active than the common whale; they remain a longer time at the bottom, and afford a smaller quantity of oil. As in the common whale the head was seen to make a third part of its bulk, so in this species the head is so large as to make one half of the whole. The tongue of this animal is small; but the throat is very formidable; and with very great ease it could swallow an ox. In the stomach of the whale scarce any thing is to be found; but in that of the cachalot there are loads of fish of different kinds; some whole, some half digested, some small, and others eight or nine feet long. The cachalot is therefore as destructive among lesser fishes as the whale is harmless; and can at one gulp swallow a shoal of fishes down its enormous gullet. Linnæus tells us that this fish pursues and terrifies the dolphins and porpoisses so much, as often to drive them on shore.

But, how formidable soever this fish may be to its fellows of the deep, it is by far the most valuable, and the most sought after by man, as it contains two very precious drugs, spermaceti

and ambergrise. The use of these, either for the purposes of luxury or medicine, is so universal, that the capture of this animal, that alone supplies them, turns out to very great advantage, particularly since the art has been found out of converting all the oil of this animal, as well as the brain, into that substance called spermaceti.

This substance, as it is naturally formed, is found in the head of the animal, and is no other than the brain. The outward skin of the head being taken off, a covering of fat offers about three inches thick; and under that, instead of a bony skull, the animal has only another thick skin, that serves for a covering and defence of the brain. The first cavity, or chamber, of the brain, is filled with that spermaceti which is supposed of the greatest purity and highest value. From this cavity there is generally drawn about seven barrels of the clearest spermaceti, that thrown upon water coagulates like cheese. Below this there is another chamber just over the gullet, which is about seven feet high; and this also contains the drug, but of less value. It is distributed in this cavity like honey in a hive, in small cells, separated from each other by a membrane like the inner skin of an egg. In proportion as the oily substance

is drawn away from this part it fills anew from every part of the body : and from this is generally obtained about nine barrels of oil. Besides this, the spinal marrow, which is about as thick as a man's thigh, and reaches all along the back-bone to the tail, where it is not thicker than one's finger, affords no inconsiderable quantity.

This substance, which is used in the composition of many medicines, rather to give them consistence than efficacy, was at first sold at a very high price, both from the many virtues ascribed to it and the small quantity that the cachalot was capable of supplying; at present, the price is greatly fallen; first, because its efficacy in medicine is found to be very small; and again, because the whole oil of the fish is very easily convertible into spermaceti. This is performed by boiling it with a lea of pot-ash, and hardening it in the manner of soap. Candles are now made of it, which are substituted for wax, and sold much cheaper; so that we need not fear having our spermaceti adulterated in the manner some medical books caution us to beware of; for they carefully guard us against having our spermaceti adulterated with virgin's wax.

As to the amb rgrise which is sometimes found in this whale, it was long considered as a substance found floating on the surface of the sea; but time, that reveals the secrets of the mercenary, has discovered that it chiefly belongs to this animal. The name, which has been improperly given to the former substance, seems more justly to belong to this; for the ambergrise is found in the place where the seminal vessels are usually situated in other animals. It is found in a bag of three or four feet long, in round lumps, from one to twenty pounds weight, floating in a fluid rather thinner than oil, and of a yellowish colour. There are never seen more than four at a time in one of these bags; and that which weighed twenty pounds, and which was the largest ever seen, was found single. These balls of ambergrise are not found in all fishes of this kind, but chiefly in the oldest and strongest. The uses of this medicine for the purposes of luxury and as a perfume are well known; though upon some subjects ignorance is preferable to information.

C H A P. VI.

Of the Dolphin, the Grampus, and the Porpeffe, with their Varieties.

ALL these fish have teeth both in the upper and the lower jaw, and are much less than the whale. The Grampus, which is the largest, never exceeds twenty feet. It may also be distinguished by the flatness of its head, which resembles a boat turned upside down. The Porpeffe resembles the grampus in most things except the snout, which is not above eight feet long; its snout also more resembles that of an hog. The Dolphin has a strong resemblance to the porpeffe, except that its snout is longer and more pointed. They have all fins on the back; they all have heads very large, like the rest of the whale kind; and resemble each other in their appetites, their manners, and conformations; being equally voracious, active, and roving.

The great agility of these animals prevents their often being taken. They seldom remain a moment above water; sometimes, indeed, their too eager pursuits expose them to danger; and a shoal of herrings often allures them out of

their depth. In such a case, the hungry animal continues to flounder in the shallows till knocked on the head, or till the retiring tide seasonably comes to its relief. But all this tribe, and the dolphin in particular, are not less swift than destructive. No fish could escape them, but from the aukward position of the mouth, which is placed in a manner under the head: yet, even with these disadvantages, their depredations as so great, that they have been justly stiled the plunderers of the deep.

What could induce the ancients to a predilection in favour of these animals, particularly the dolphin, it is not easy to account for. Historians and philosophers seem to have contended who should invent the greatest number of fables concerning them. The dolphin was celebrated in the earliest time for its fondness to the human race, and was distinguished by the epithets of the boy-loving and philanthropist. Scarce an accident could happen at sea but the dolphin offered himself to convey the unfortunate to shore. The musician flung into the sea by pirates, the boy taking an airing into the midst of the sea, and returning again in safety, were obliged to the dolphin for its services. It is not easy, I say, to assign a cause why the ancients should thus have invented so

many fables in their favour. The figure of these animals is far from prejudicing us in their interests; their extreme rapacity tends still less to endear them: I know nothing that can reconcile them to man and excite his prejudices, except that when taken they sometimes have a plaintiff moan, with which they continue to express their pain till they expire. This, at first, might have excited human pity; and that might have produced affection. At present, these fishes are regarded even by the vulgar in a very different light; their appearance is far from being esteemed a favourable omen by the seamen; and from their boundings, springs, and frolics in the water, experience has taught the mariners to prepare for a storm.

But it is not to one circumstance only that the ancients have confined their fabulous reports concerning these animals; as from their leaps out of their element, they assume a temporary curvature, which is by no means their natural figure in the water, the old painters and sculptors have universally drawn them wrong. A dolphin is scarce ever exhibited by the ancients in a straight shape, but curved, in the position which they sometimes appear in when exerting their force; and the poets too have adopted the general error. Even Pliny, the best natu-

ralist, has asserted, that they instantly die when taken out of the water; but Rondelet, on the contrary, assures us, that he has seen a dolphin carried alive from Montpellier to Lyons.

The moderns have more just notions of these animals; and have got over the many fables, which every day's experience contradicts. Indeed their numbers are so great, and, though shy, they are so often taken, that such peculiarities, if they were possessed of any, would have been long since ascertained. They are found, the porpessè especially, in such vast numbers, in all parts of the sea that surrounds this kingdom, that they are sometimes noxious to seamen, when they sail in small vessels. In some places they almost darken the water as they rise to take breath, and particularly before bad weather are much agitated, swimming against the wind, and tumbling about with unusual violence.

Whether these motions be the gambols of pleasure, or the agitations of terror, is not well known. It is most probable that they dread those seasons of turbulence, when the lesser fishes shrink to the bottom, and their prey no longer offers in sufficient abundance. In times of fairer weather, they are seen herding together, and pursuing shoals of various fish

with great impetuosity. Their method of hunting their game, if it may be so called, is to follow in a pack, and thus give each other mutual assistance. At that season when the mackarel, the herring, the salmon, and other fish of passage, begin to make their appearance, the cetaceous tribes are seen fierce in the pursuit; urging their prey from one creek or bay to another, deterring them from the shallows, driving them towards each other's ambush, and using a greater variety of arts than hounds are seen to exert in pursuing the hare. However, the porpoise not only seeks for prey near the surface, but often descends to the bottom in search of sand-eels and sea-worms, which it roots out of the sand with its nose, in the manner hogs harrow up the fields for food. For this purpose, the nose projects a little, is shorter and stronger than that of the dolphin; and the neck is furnished with very strong muscles, which enable it the readier to turn up the sand.

But it sometimes happens, that the impetuosity, or the hunger, of these animals, in their usual pursuits, urges them beyond the limits of safety. The fishermen, who extend their long nets for pilchards, on the coasts of Cornwall, have sometimes an unwelcome cap-

ture in one of these. Their feeble nets, which are calculated only for taking smaller prey, suffer an universal laceration, from the efforts of this strong animal to escape; and if it be not knocked on the head, before it has had time to flounder, the nets are destroyed, and the fishery interrupted. There is nothing, therefore, they so much dread, as the entangling a porpesse; and they do every thing to intimidate the animal from approaching.

Indeed, these creatures are so violent in the pursuit of their prey, that they sometimes follow a shoal of small fishes up a fresh-water river, from whence they find no small difficulty to return. We have often seen them taken in the Thames at London, both above the bridges and below them. It is curious enough to observe with what activity they avoid their pursuers, and what little time they require to fetch breath above the water. The manner of killing them is for four or five boats to spread over the part of the river in which they are seen, and with fire-arms to shoot at them the instant they rise above the water. The fish being thus for some time kept in agitation, requires to come to the surface at quicker intervals, and thus affords the marksmen more frequent opportunities.

When the porpesse is taken, it becomes no

inconsiderable capture, as it yields a very large quantity of oil; and the lean of some, particularly if the animal be young, is said to be as well tasted as veal. The inhabitants of Norway prepare from the eggs found in the body of this fish, a kind of caviar, which is said to be very delicate sauce, or good when even eaten with bread. There is a fishery for porpess along the western isles of Scotland during the summer season, when they abound on that shore; and this branch of industry turns to good advantage.

As for the rest, we are told, that these animals go with young ten months; that, like the whale, they seldom bring forth above one at a time, and that in the midst of summer: that they live to a considerable age; though some say not above twenty-five or thirty years; and they sleep with the snout above water. They seem to possess, in a degree proportioned to their bulk, the manners of whales; and the history of one species of cetaceous animals will, in a great measure, serve for all the rest.

CHAPTER 1. THE STATE OF THE UNION.

THE STATE OF THE UNION, AS IT APPEARS TO THE EYE, IS A

LAND OF CONTRAST. THE SCENERY IS VARYING AND INTERESTING.

THE CLIMATE IS HEALTHY AND PLEASANT. THE PEOPLE ARE

INDUSTRIOUS AND CAPABLE. THE COUNTRY IS RICH AND

BEAUTIFUL. THE AIR IS PURE AND FRESH. THE WATER IS

CLEAR AND COLD. THE FOOD IS GOOD AND CHEAP. THE

ENTERTAINMENT IS INTERESTING AND ENJOYABLE. THE

COMFORT IS SUFFICIENT. THE CONVENIENCE IS

COMPLETE. THE SAFETY IS ASSURED. THE PEACE IS

PERFECT. THE ORDER IS STRICT. THE DISCIPLINE IS

SEVERE. THE PUNISHMENT IS CERTAIN. THE REWARD IS

LIBERAL. THE PROSPECT IS BRIGHT. THE FUTURE IS

GLORIOUS. THE TRIUMPH IS CERTAIN. THE VICTORY IS

COMPLETE. THE REIGN IS PERMANENT. THE DOMINION IS

ABSOLUTE. THE POWER IS SUPREMACY. THE GLORY IS

PERPETUAL. THE HONOR IS ETERNAL. THE NAME IS

REVERED. THE MEMORY IS SACRED. THE LEGACY IS

PRECIOUS. THE TREASURE IS INVALUABLE. THE WEALTH IS

INCALCULABLE. THE INFLUENCE IS OMNIPOTENT. THE

GLORY IS UNLIMITED. THE TRIUMPH IS ETERNAL. THE

REIGN IS PERMANENT. THE DOMINION IS ABSOLUTE. THE

POWER IS SUPREMACY. THE GLORY IS PERPETUAL. THE

HONOR IS ETERNAL. THE NAME IS REVERED. THE

MEMORY IS SACRED. THE LEGACY IS PRECIOUS. THE

TREASURE IS INVALUABLE. THE WEALTH IS INCALCULABLE.

THE INFLUENCE IS OMNIPOTENT. THE GLORY IS UNLIMITED.

THE TRIUMPH IS ETERNAL. THE REIGN IS PERMANENT.

THE DOMINION IS ABSOLUTE. THE POWER IS SUPREMACY.

THE GLORY IS PERPETUAL. THE HONOR IS ETERNAL.

THE NAME IS REVERED. THE MEMORY IS SACRED.

O F

CARTILAGINOUS FISHES.

P A R T II.

VOL. VI.

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ETIENNE WISLITZ

P. A. R. F.

VI

C H A P. I.

Of Cartilaginous Fishes in General.

WE have seen that fishes of the cetaceous kind bear a strong resemblance to quadrupedes in their conformation ; those of the cartilaginous kinds are one remove separated from them ; they form the shade that completes the imperceptible gradations of nature.

The first great distinction they exhibit is, in having cartilages or gristles instead of bones. The cetaceous tribes have their bones entirely resembling those of quadrupedes, thick, white, and filled with marrow : those of the spinous kind, on the contrary, have small slender bones, with points resembling thorns, and generally solid throughout. Fishes of the cartilaginous kinds have their bones always soft and yielding ; and age, that hardens the bones of other animals, rather contributes still more to soften theirs. The size of all fishes encreases with age ; but from the pliancy of the bones in this tribe, they seem to have no bounds placed to their dimensions : and it is supposed that they grow larger every day till they die.

They have other differences, more obviously discernible. We have observed, that the cetaceous tribes had lungs like quadrupedes, an heart with its partition in the same manner, and an apparatus for hearing, on the other hand we mentioned, that the spinous kinds had no organs of hearing, no lungs to breathe through, and no partition in the heart; but that their cold red blood was circulated by the means of the impulse made upon their gills by the water. Cartilaginous fishes unite both these systems in their conformation: like the cetaceous tribes, they have organs of hearing, and lungs; like the spinous kinds, they have gills, and an heart without a partition. Thus possessed of a two-fold power of breathing, sometimes by means of their lungs, sometimes by that of their gills, they seem to unite all the advantages of which their situation is capable, and drawing from both elements, every aid to their necessities or their enjoyments.

This double capacity of breathing in these animals, is one of the most remarkable features in the history of nature. The apertures by which they breathe, are somewhere placed about the head; either beneath, as in flat fish; on the sides, as in sharks; or on the top of the head, as in pipe-fish. To these apertures are the gills

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affixed, but without any bone to open and shut them, as in spinous fishes; from which, by this mark, they may be easily distinguished, though otherwise very much alike in appearance. From these are bending cylindrical ducts, that run to the lungs, and are supposed to convey the air, that gives the organs their proper play. The heart, however, has but one valve; so that their blood wants that double circulation which obtains in the cetaceous kinds; and the lungs seem to me rather as an internal assistant to the gills, than fitted for supplying the same offices as in quadrupedes, for they want the pulmonary vein and artery.

From this structure, however, the animal is enabled to live a longer time out of water than those whose gills are more simple. The cartilaginous shark, or ray, live some hours after they are taken; while the spinous herring or mackarel expire a few minutes after they are brought on shore. From hence this tribe seems possessed of powers that other fishes are wholly deprived of; they can remain continually under water, without ever taking breath; while they can venture their heads above the deep, and continue for hours out of their native element.

We observed, in a former chapter, that spinous fishes have not, or at least appear not to

have, externally any instruments of generation. It is very different with those of the cartilaginous kind, for the male always has these instruments double. The fish of this tribe are not unfrequently seen to copulate; and their manner is belly to belly, such as may naturally be expected from animals whose parts of generation are placed forward. They in general chuse colder seasons and situations than other fish for propagating their kind; and many of them bring forth in the midst of winter.

The same duplicity of character which marks their general conformation obtains also with regard to their manner of bringing forth. Some bring forth their young alive; and some bring forth eggs, which are afterwards brought to maturity. In all, however, the manner of gestation is nearly the same; for upon dissection, it is ever found, that the young, while in the body, continue in the egg till a very little time before they are excluded: these eggs they may properly be said to hatch within their body; and as soon as their young quit the shell, they begin to quit the womb also. Unlike to quadrupeds, or the cetaceous tribes, that quit the egg state a few days after their first conception, and continue in the womb several months after, these continue in the body of the female, in their egg

state, for weeks together; and the eggs are found linked together by a membrane, from which, when the foetus gets free, it continues but a very short time till it delivers itself from its confinement in the womb. The eggs themselves consist of a white and a yolk, and have a substance, instead of shell, that aptly may be compared to softened horn. These, as I observed, are sometimes hatched in the womb, as in the shark and ray kinds; and they are sometimes excluded, as in the sturgeon, before the animal comes to its time of disengaging. Thus we see that there seems very little difference between the viviparous and the oviparous kinds, in this class of fishes; the one hatch their eggs in the womb, and the young continue no long time there; the others exclude their eggs before hatching, and leave it to time and accident to bring their young to maturity.

Such are the peculiar marks of the cartilaginous class of fishes, of which there are many kinds. To give a distinct description of every fish is as little my intention, as perhaps it is the wish of the reader; but the peculiarities of each kind deserve notice, and the most striking of these it would be unpardonable to omit.

Cartilaginous fish may be divided first into

those of the shark kind, with a body growing less towards the tail, a rough skin, with the mouth placed far beneath the end of the nose, five apertures on the sides of the neck for breathing, and the upper part of the tail longer than the lower. This class chiefly comprehends the Great White Shark, the Balance Fish, the Hound Fish, the Monk Fish, the Dog Fish, the Basking Shark, the *Zygæna*, the Tope, the Cat Fish, the Blue Shark, the Sea Fox, the Smooth Hound Fish, and the Porbeagle. These are all of the same nature, and differ more in size than in figure or conformation.

The next division is that of flat fish; and these their broad, flat, thin shape is sufficiently capable of distinguishing from all others of this kind. They may be easily distinguished also from spinous flat fish, by the holes through which they breathe, which are uncovered by a bone; and which, in this kind, are five on each side. In this tribe we may place the Torpedo, the Skate, the Sharp-nosed Ray, the Rough Ray, the Thornback, and the Fire Flare.

The third division is that of the slender snake-shaped kind: such as the Lamprey, the Pride, and the Pipe Fish.

The fourth division is of the sturgeon and its variety, the Ising-glass Fish.

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The last division may comprise fish of different figures and natures, that do not rank under the former divisions. These are the Sun Fish, the Tetrodon, the Lump Fish, the Sea snail, the Chimæra, and the Fishing Frog. Each of these has somewhat peculiar in its powers or its form, that deserves to be remarked. The description of the figures of these at least may compensate for our general ignorance of the rest of their history.

C H A P.

C H A P. II.

Of Cartilaginous Fishes of the Shark Kind.

OF all the inhabitants of the deep, those of the shark kind are the fiercest and the most voracious. The smallest of this tribe is not less dreaded by greater fish, than many that to appearance seem more powerful; nor do any of them seem fearful of attacking animals far above their size: but the Great White Shark, which is the largest of the kind, joins to the most amazing rapidity, the strongest appetites for mischief: as he approaches nearly in size to the whale, he far surpasses him in strength and celerity, in the formidable arrangement of his teeth, and his insatiable desire of plunder.

The white shark is sometimes seen to rank even among whales for magnitude; and is found from twenty to thirty feet long. Some assert that they have seen them of four thousand pound weight; and we are told particularly of one, that had a human corpse in his belly. The head is large, and somewhat flattened; the snout long, and the eyes large. The mouth is enormously wide; as is the throat, and capable of swallowing a man with great ease. But its

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furniture of teeth is still more terrible : of these there are six rows, extremely hard, sharp-pointed, and of a wedge-like figure. It is asserted that there are seventy-two in each jaw, which make one hundred and forty-four in the whole ; yet others think that their number is uncertain ; and that, in proportion as the animal grows older, these terrible instruments of destruction are found to encrease. With these the jaws both above and below appear planted all over ; but the animal has a power of erecting or depressing them at pleasure. When the shark is at rest, they lie quite flat in his mouth ; but when he prepares to seize his prey, he erects all this dreadful apparatus, by the help of a set of muscles that join them to the jaw ; and the animal he seizes, dies pierced with an hundred wounds in a moment.

Nor is this fish less terrible to behold as to the rest of his form : his fins are larger, in proportion ; he is furnished with great goggle eyes, that he turns with ease on every side, so as to see his prey behind him as well as before : and his whole aspect is marked with a character of malignity : his skin also is rough, hard and prickly ; being that substance which covers instrument cases, called shagreen.

As the shark is thus formidable in his appearance, so is he also dreadful, from his courage and activity. No fish can swim so fast as he; none so constantly employed in swimming, he outstrips the swiftest ships, plays round them, darts out before them, returns, seems to gaze at the passengers, and all the while does not seem to exhibit the smallest symptom of an effort to proceed. Such amazing powers, with such great appetites for destruction, would quickly unpeople even the ocean, but providentially the shark's upper jaw projects so far above the lower, that he is obliged to turn on one side (not on his back, as is genenerally supposed) to seize his prey. As this takes some small time to perform, the animal pursued seizes that opportunity to make its escape.

Still, however, the depredations he commits are frequent and formidable. The shark is the dread of sailors in all hot climates; where, like a greedy robber, he attends the ships, in expectation of what may drop over board. A man who unfortunately falls into the sea at such a time, is sure to perish, without mercy. A sailor that was bathing in the Mediterranean, near Antibes, in the year 1744, while he was swimming about fifty yards from the ship,

perceived a monstrous fish making towards him and surveying him on every side, as fish are often seen to look round a bait. The poor man, struck with terror at its approach, cried out to his companions in the vessel to take him on board. They accordingly threw him a rope with the utmost expedition, and were drawing him up by the ship's side, when the shark darted after him from the deep, and snapped off his leg.

Mr. Pennant tells us, that the master of a Guinea-ship, finding a rage for suicide prevail among his slaves, from a notion the unhappy creatures had, that after death they should be restored again to their families, friends and country; to convince them at least that some disgrace should attend them here, he ordered one of their dead bodies to be tied by the heels to a rope, and so let down into the sea; and though it was drawn up again with great swiftness, yet, in that short space, the sharks had bit off all but the feet. Whether this story is prior to an accident of the same kind, which happened at Belfast, in Ireland, about twenty years ago, I will not take upon me to determine; but certain it is, there are some circumstances alike in both, though more terrible in that I am going to relate. A Guinea captain was,

by stress of weather, driven into the harbour of Belfast, with a lading of very sickly slaves, who, in the manner above-mentioned, took every opportunity to throw themselves over board when brought up upon deck, as is usual, for the benefit of the fresh air. The captain perceiving, among others, a woman slave attempting to drown herself, pitched upon her as a proper example to the rest: as he supposed that they did not know the terrors attending death, he ordered the woman to be tied with a rope under the arm-pits, and so let her down into the water. When the poor creature was thus plunged in, and about half way down, she was heard to give a terrible shriek, which at first was ascribed to her fears of drowning; but soon after the water appearing red all round her, she was drawn up, and it was found that a shark, which had followed the ship, had bit her off from the middle.

Such is the frightful rapacity of this animal; nothing that has life is rejected. But it seems to have a peculiar enmity to man: when once it has tasted human flesh, it never desists from haunting those places where it expects the return of its prey. It is even asserted, that along the coasts of Africa, where these animals are found in great abundance, numbers of the

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Negroes, who are obliged to frequent the waters, are seized and devoured by them every year. The people of these coasts are firmly of opinion, that the shark loves the black man's flesh in preference to the white; and that when men of different colours are in the water together, it always makes choice of the former.

However this be, men of all colours are equally afraid of this animal, and have contrived different methods to destroy him. In general, they derive their success from the shark's own rapacity. The usual method of our sailors to take him, is by baiting a great hook with a piece of beef or pork, which is thrown out into the sea by a strong cord, strengthened near the hook with an iron chain. Without this precaution, the shark would quickly bite the cord in two, and thus set himself free. It is no unpleasant amusement to observe this voracious animal coming up to survey the bait, particularly when not pressed by hunger. He approaches it, examines it, swims round it, seems for a while to neglect it, perhaps apprehensive of the cord and the chain: he quits it for a little; but his appetite pressing, he returns again; appears preparing to devour it, but quits it once more. When the sailors have sufficiently diverted themselves with his

different evolutions, they then make a pretence, by drawing the rope, as if intending to take the bait away ; it is then that the glutton's hunger excites him ; he darts at the bait, and swallows it, hook and all. Sometimes, however, he does not so entirely gorge the whole, but that he once more gets free ; yet even then, though wounded and bleeding with the hook, he will again pursue the bait until he is taken. When he finds the hook lodged in his maw, his utmost efforts are then excited, but in vain, to get free ; he tries with his teeth to cut the chain ; he pulls with all his force to break the line ; he almost seems to turn his stomach inside out, to disgorge the hook ; in this manner he continues his formidable though fruitless efforts ; till quite spent, he suffers his head to be drawn above water, and the sailors, confining his tail by a nooze, in this manner draw him on ship board, and dispatch him. This is done by beating him on the head till he dies ; yet even that is not effected without difficulty and danger ; the enormous creature, terrible even in the agonies of death, still struggles with his destroyers ; nor is there an animal in the world that is harder to be killed. Even when cut in pieces, the muscles still preserve their motion, and vibrate for some minutes after being separated from the body.

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Another method of taking him, is by striking a barbed instrument, called a fizgig, into his body, as he brushes along by the side of the ship. As soon as he is taken up, to prevent his flouncing, they cut off the tail with an ax, with the utmost expedition.

This is the manner in which Europeans destroy the shark ; but some of the Negroes along the African coast, take a bolder and more dangerous method to combat their terrible enemy. Armed with nothing more than a knife, the Negroe plunges into the water, where he sees the shark watching for his prey, and boldly swims forward to meet him ; though the great animal does not come to provoke the combat, he does not avoid it, and suffers the man to approach him ; but just as he turns upon his side to seize the aggressor, the Negroe watches the opportunity, plunges his knife in the fish's belly, and pursues his blows with such success that he lays the ravenous tyrant dead at the bottom : he soon however returns, fixes the fish's head in a nooze, and drags him to shore, where he makes a noble feast for the adjacent villages.

Nor is man alone the only enemy this fish has to fear : the Remora, or Sucking Fish, is probably a still greater, and follows the shark

every where. This fish has got a power of adhering to whatever it sticks against, in the same manner as a cupping-glass sticks to the human body. It is by such an apparatus that this animal sticks to the shark, and drains away its moisture. The seamen, however, are of opinion, that it is seen to attend on the shark for more friendly purposes, to point him to his prey, and to apprize him of his danger. For this reason it has been called the Shark's Pilot.

The shark so much resembles the whale in size, that some have injudiciously ranked it in the class of cetaceous fishes: but its real rank is in the place here assigned it, among those of the cartilaginous kind. It breathes with gills and lungs, its bones are gristly, and it brings forth several living young; Belonius assures us, that he saw a female shark produce eleven live young ones at a time. But I will not take upon me to vouch for the veracity of Rondeletius, who when talking of the blue shark, says, that the female will permit her small brood, when in danger to swim down her mouth, and take shelter in her belly. Mr. Pennant indeed, seems to give credit to the story, and thinks that this fish, like the Oppossum, may have a place fitted by Nature for the reception of her young. To his opinion much deference is due, and is suf-

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ficient, at least to make us suspend our assent; for nothing is so contemptible as that affectation of wisdom which some display, by universal incredulity.

Upon the whole, a shark, when living, is a very formidable animal; and, when dead, is of very little value. The flesh is hardly digestible by any but the Negroes, who are fond of it to distraction; the liver affords three or four quarts of oil; some imaginary virtues have been ascribed to the brain; and its skin is, by great labour, polished into that substance called shagreen. Mr. Pennant is of opinion, that the female is larger than the male in all this tribe; which would, if confirmed by experience, make a striking agreement between them and birds of prey. It were to be wished that succeeding historians would examine into this observation, which is offered only as a conjecture!

CHAP.

R 2

C H A P. III.

Of Cartilaginous Flat-Fish, or the Ray Kind.

THE same rapacity which impels the shark along the surface of the water, actuates the flat fish at the bottom. Less active and less formidable, they creep in security along the bottom, seize every thing that comes in their way; neither the hardest shells nor the sharpest spines give protection to the animals that bear them: their insatiable-hunger is such, that they devour all; and the force of their stomach is so great, that it easily digests them.

The whole of this kind resemble each other very strongly in their figure; nor is it easy without experience to distinguish one from another. The stranger to this dangerous tribe may imagine he is only handling a skate when he is instantly struck numb by the torpedo; he may suppose he has caught a thornback till he is stung by the fire-flare. It will be proper, therefore, after describing the general figure of these animals, to mark their differences.

All fish of the ray kind are broad, cartilaginous, swimming flat on the water, and having spines on different parts of their body, or at

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the tail. They all have their eyes and mouth placed quite under the body, with apertures for breathing either about or near them. They all have teeth, or a rough bone, which answers the same purpose. Their bowels are very wide towards the mouth, and go on diminishing to the tail. The tail is very differently shaped from that of other fishes; and at first sight more resembling that of a quadrupede, being narrow, and ending either in a bunch or a point. But what they are chiefly distinguished by, is their spines or prickles, which the different species have on different parts of their body. Some are armed with spines both above and below; others have them on the upper part only; some have their spines at the tail; some have three rows of them, and others but one. These prickles in some are comparatively soft and feeble; those of others, strong and piercing. The smallest of these spines are usually inclining towards the tail; the larger towards the head.

It is by the spines that these animals, are distinguished from each other. The skate has the middle of the back rough, and a single row of spines on the tail. The sharp nosed ray has ten spines that are situated towards the middle of the back. The rough ray

has its spines spread indiscriminately over the whole back. The thorn-back has its spines disposed in three rows upon the back. The fire-flare has but one spine, but that indeed a terrible one. This dangerous weapon is placed on the tail, about four inches from the body, and is not less than five inches long. It is of a flinty hardness, the sides thin, sharp pointed, and closely and sharply bearded the whole way. The last of this tribe that I shall mention is the torpedo; and this animal has no spines that can wound; but in the place of them it is possessed of one of the most potent and extraordinary faculties in nature.

Such are the principal differences that may enable us to distinguish animals, some of which are of very great use to mankind, from others that are terrible and noxious. With respect to their uses indeed, as we shall soon see, they differ much; but the similitude among them, as to their nature, appetites, and conformation, is perfect and entire. They are all as voracious as they are plenty; and as dangerous to a stranger as useful to him who can distinguish their differences.

Of all the larger fish of the sea, these are the most numerous; and they owe their numbers to their size. Except the white shark and cachalot alone, there is no other fish that has a swallow

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large enough to take them in; and their spines make them a still more dangerous morsel. Yet the size of some is such, that even the shark himself is unable to devour them: we have seen some of them in England weigh above two hundred pounds; but that is nothing to their enormous bulk in other parts of the world. Labat tells us of a prodigious ray that was speared by the Negroes at Guadaloupe, which was thirteen feet eight inches broad, and above ten feet from the snout to the insertion of the tail. The tail itself was in proportion, for it was no less than fifteen feet long; twenty inches broad at its insertion, and tapering to a point. The body was two feet in depth; the skin as thick as leather, and marked with spots; which spots, in all of this kind, are only glands, that supply a mucus to lubricate and soften the skin. This enormous fish was utterly unfit to be eaten by the Europeans; but the Negroes chose out some of the nicest bits, and carefully salted them up as a most favourite provision.

Yet, large as this may seem, it is very probable that we have seen only the smallest of the kind; as they generally keep at the bottom, the largest of the kind are seldom seen; and, as they may probably have been growing for ages, the extent of their magnitude is un-

known. It is generally supposed, however, that they are the largest inhabitants of the deep; and, were we to credit the Norway Bishop, there are some above a mile over. But to suppose an animal of such magnitude is absurd; yet the over-stretching the supposition does not destroy the probability that animals of this tribe grow to an enormous size.

The ray generally chuses for its retreat such parts of the sea as have a black muddy bottom; the large ones keep at greater depths; but the smaller approach the shores, and feed upon whatever living animals they can surprise, or whatever putrid substances they meet with. As they are ravenous, they easily take the bait, yet will not touch it if be taken up and kept a day or two out of water. Almost all fish appear much more delicate with regard to a baited hook than their ordinary food. They appear by their manner to perceive the line and to dread it; but the impulse of their hunger is too great for their caution; and, even though they perceive the danger, if thoroughly hungry they devour the destruction.

These fish generate in March and April; at which time only they are seen swimming near the surface of the water, several of the males pursuing one female. They adhere so fast to-

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gether in coition, that the fishermen frequently draw up both together, though only one has been hooked. The females are prolific to an extreme degree; there having been no less than three hundred eggs taken out of the body of a single ray. These eggs are covered with a tough horny substance, which they acquire in the womb; for before they descend into that, they are attached to the ovary pretty much in the same manner as in the body of a pullet. From this ovary, or egg-bay, as it is vulgarly called, the fish's eggs drop one by one into the womb, and there receive a shell by the concretion of the fluids of that organ. When come to the proper maturity, they are excluded, but never above one or two at a time, and often at intervals of three or four hours. These eggs, or purfes, as the fishermen call them, are usually cast about the beginning of May, and they continue casting during the whole summer. In October, when their breeding ceases, they are exceedingly poor and thin; but in November they begin to improve, and grow gradually better till May, when they are in the highest perfection.

It is chiefly during the winter season that our fishermen take them; but the Dutch, who are indefatigable, begin their operations earlier,

and fish with better success than we. The method practised by the fishermen of Scarborough is thought to be the best among the English; and, as Mr. Pennant has given a very succinct account of it, I will take leave to present it to the reader.

“ When they go out to fish, each person is
 “ provided with three lines: each man’s lines
 “ are fairly coiled upon a flat oblong piece of
 “ wicker work; the hooks being baited and
 “ placed very regularly in the centre of the coil.
 “ Each line is furnished with two hundred and
 “ eighty hooks, at the distance of six feet two
 “ inches from each other. The hooks are
 “ fastened to lines of twisted horse-hair, twenty-
 “ seven inches in length.

“ When fishing, there are always three men
 “ in each coble; and consequently nine of these
 “ lines are fastened together and used as one
 “ line, extending in length near three miles,
 “ and furnished with above two thousand five
 “ hundred hooks. An anchor and a buoy are
 “ fixed at the first end of the line, and one more
 “ at each end of each man’s lines: in all,
 “ four anchors, and four buoys made of leather
 “ or cork. The line is always laid across the
 “ current. The tides of flood and ebb continue
 “ an equal time upon our coast; and, when

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"undisturbed by winds, run each way about
"fix hours. They are so rapid that the fisher-
"men can only shoot and haul their lines at the
"turn of the tide ; and therefore the lines al-
"ways remain upon the ground about fix hours.
"The same rapidity of tide prevents their using
"hand lines ; and therefore two of the people
"commonly wrap themselves in the sail and
"sleep, while the other keeps a strict look-out,
"for fear of being run down by ships, and to
"observe the weather : for storms often rise
"so suddenly, that it is sometimes with extreme
"difficulty they escape to the shore, though
"they leave lines behind them.

"The coble is twenty feet six inches long,
"and five feet extreme breadth. It is about
"one ton burthen, rowed with three pair of
"oars, and admirably constructed for the pur-
"pose of encountering a mountainous sea.
"They hoist sail when the wind suits.

"The five-men-boat is forty feet long,
"fifteen broad, and twenty-five tons burthern.
"It is so called, though navigated by six men
"and a boy ; because one of the men is hired
"to cook, and does not share in the profits
"with the other five. All our able fishermen go
"in these boats to the herring-fishery at Yar-
"mouth, the latter end of September, and

“ return about the middle of November. The
“ boats are then laid up until the beginning of
“ Lent, at which time they go off in them to
“ the edge of the Dogger, and other places, to
“ fish for turbot, cod, ling, skates, &c. They
“ always take two cibles on board, and when
“ they come upon their ground, anchor the
“ boat, throw out the cibles, and fish in the
“ same manner as those do who go from the
“ shore in a cible; with this difference only,
“ that here each man is provided with double
“ the quantity of lines, and, instead of waiting
“ the return of the tide in the cible, return to
“ the boat and bait their other lines; thus
“ hawling one set, and shooting another, every
“ turn of tide. They commonly run into the
“ harbour twice a week, to deliver their fish.
“ The five-men-boat is decked at each end,
“ but open in the middle, and has two long
“ sails.

“ The best bait for all kinds of fish, is fresh
“ herring cut in pieces of a proper size; and,
“ notwithstanding what has been said to the
“ contrary, they are taken there at any time in
“ the winter, and all the spring, whenever the
“ fishermen put down their nets for that pur-
“ pose: the five-men-boats always take some
“ nets for that end. Next to herrings are the

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“ lesser lampreys, which come all winter by
“ land-carriage from Tadcaster. The next baits
“ in esteem are small haddocks cut in pieces,
“ sand worms, muscles, and limpets: and lastly,
“ when none of these can be found, they use
“ bullock’s liver. The hooks used there are
“ much smaller than those employed at Iceland
“ and Newfoundland. Experience has shewn
“ that the larger fish will take a living small
“ one upon the hook, sooner than any bait that
“ can be put on; therefore they use such as the
“ fish can swallow. The hooks are two inches
“ and an half long in the shank; and near an
“ inch wide between the shank and the point.
“ The line is made of small cording, and is
“ always tanned before it is used. All the rays
“ and turbot are extremely delicate in their
“ choice of baits: if a piece of herring or had-
“ dock has been twelve hours out of the sea,
“ and then used as a bait, they will not
“ touch it.”

Such is the manner of fishing for those fish
that usually keep near the bottom on the coasts
of England; and Duhamel observes, that the
best weather for succeeding, is a half calm, when
the waves are just curled with a silent breeze.

But this extent of line, which runs, as we
have seen, three miles along the bottom, is

nothing to what the Italians throw out in the Mediterranean. Their fishing is carried on in a tartan, which is a vessel much larger than our's; and they bait a line of no less than twenty miles long, with above ten or twelve thousand hooks. This line is called the *parafina*; and the fishing goes by that of the *pielago*. This line is not regularly drawn every six hours, as with us, but remains for some time in the sea; and it requires the space of twenty-four hours to take it up. By this apparatus they take rays, sharks, and other fish; some of which are above a thousand pound weight. When they have caught any of this magnitude, they strike them through with an harpoon to bring them on board, and kill them as fast as they can.

This method of catching fish is obviously fatiguing and dangerous; but the value of the capture generally repays the pain. The skate and the thornback are very good food; and their size, which is from ten pounds to two hundred weight, very well rewards the trouble of fishing for them. But it sometimes happens that the lines are visited by very unwelcome intruders; by the rough ray, the fireflare, or the torpedo. To all these the fishermen have the most mortal antipathy; and, when discovered,

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shudder at the sight : however, they are not always so much upon their guard, but that they sometimes feel the different resentments of this angry tribe ; and, instead of a prize, find they have caught a vindictive enemy. When such is the case, they take care to throw them back into the sea with the swiftest expedition.

The rough ray inflicts but slight wounds with the prickles with which its whole body is furnished. To the ignorant it seems harmless, and a man would at first fight venture to take it in his hand, without any apprehension ; but he soon finds, that there is not a single part of its body that is not armed with spines ; and that there is no way of seizing the animal, but by the little fin at the end of the tail.

But this animal is harmless, when compared to the Fireflare, which seems to be the dread of even the boldest and most experienced fishermen. The weapon with which Nature has armed this animal, which grows from the tail, and which we described as barbed and five inches long, hath been an instrument of terror to the ancient fishermen as well as the moderns : and they have delivered many tremendous fables of its astonishing effects. Pliny, Ælian, and Oppian, have supplied it with a venom that affects even the inanimate creation : trees that are struck by it, instantly lose their verdure ;

and rocks themselves are incapable of resisting the potent poison. The enchantress Circe armed her son with a spear headed with the spine of the trygon, as the most irresistible weapon she could furnish him with ; a weapon that soon after was to be the death of his own father.

That spears and darts, says Mr. Pennant, might in very early times have been headed with this bone instead of iron, we have no doubt. The Americans head their arrows with the bones of fishes to this day ; and from their hardness and sharpness, they are no contemptible weapons. But that this spine is possessed of those venomous qualities ascribed to it, we have every reason to doubt ; though some men of high reputation, and the whole body of fishermen, contend for its venomous effects. It is, in fact, a weapon of offence belonging to this animal, and capable, from its barbs, of inflicting a very terrible wound, attended with dangerous symptoms ; but it cannot be possessed of any poison, as the spine has no sheath to preserve the supposed venom on its surface ; and the animal has no gland that separates the noxious fluid : besides, all those animals that are furnished with envenomed fangs or stings, seem to have them strongly connected with their safety and existence ; they never part with them ; there

is an apparatus of poison prepared in the body to accompany their exertions; and when the fangs or stings are taken away, the animal languishes and dies. But it is otherwise with the spine of the fireflare; it is fixed to the tail, as a quill is into the tail of a fowl, and is annually shed in the same manner: it may be necessary for the creature's defence, but is no way necessary for its existence. The wound inflicted by an animal's tail, has something terrible in the idea, and may from thence alone be supposed to be fatal. From hence terror might have added poison to the pain, and called up imagined dangers: the Negroes universally believe that the sting is poisonous; but they never die of the wound; for, by opening the fish, and laying it to the part injured, it effects a speedy cure. The slowness of the remedy proves the innocence of the wound.

The Torpedo is an animal of this kind, equally formidable and well known with the former; but the manner of its operating, is to this hour a mystery to mankind. The body of this fish is almost circular, and thicker than others of the ray kind; the skin is soft, smooth, and of a yellowish colour, marked, as all the kind, with large annular spots; the eyes very small; the tail tapering to a point; and the weight

of the fish from a quarter to fifteen pounds. Redi found one twenty-four pounds weight. To all outward appearance, it is furnished with no extraordinary powers; it has no muscles formed for particularly great exertions; no internal conformation perceptibly differing from the rest of its kind: yet such is that unaccountable power it possesses, that, the instant it is touched, it numbs not only the hand and arm, but sometimes also the whole body. The shock received, by all accounts, most resembles the stroke of an electrical machine; sudden, tingling, and painful. "The instant," says Kempfer, "I touched it with my hand, I felt " a terrible numbness in my arm, and as far up " as the shoulder. Even if one treads upon it " with the shoe on, it affects not only the leg, " but the whole thigh upwards. Those who " touch it with the foot, are seized with a " stronger palpitation than even those who " touched it with the hand. This numbness " bears no resemblance to that which we feel " when a nerve is a long time pressed, and the " foot is said to be asleep; it rather appears " like a sudden vapour, which passing through " the pores in an instant, penetrates to the very " springs of life, from whence it diffuses itself " over the whole body, and gives real pain. " The nerves are so affected, that the person

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"struck imagines all the bones of his body,
 "and particularly those of the limb that re-
 "ceived the blow, are driven out of joint. All
 "this is accompanied with an universal tremor,
 "a sickness of the stomach, a general convul-
 "sion, and a total suspension of the faculties of
 "the mind. In short," continues Kempfer,
 "such is the pain, that all the force of our
 "promises and authority could not prevail upon
 "a seaman to undergo the shock a second time.
 "A Negroe indeed, that was standing by, rea-
 "dily undertook to touch the torpedo; and
 "was seen to handle it without feeling any of
 "its effects. He informed us, that his whole
 "secret consisted in keeping in his breath;
 "and we found, upon trial, that this method
 "answered with ourselves. When we held in
 "our breath, the torpedo was harmless; but
 "when we breathed ever so little, its efficacy
 "took place."

Kempfer has very well described the effects of
 this animal's shock; but succeeding experience
 has abundantly convinced us, that holding in
 the breath no way guards against its violence.
 Those, therefore, who, depending on that re-
 ceipt, should play with a torpedo, would soon
 find themselves painfully undeceived: not but
 that this fish may be many times touched with

perfect security; for it is not upon every occasion that it exerts its potency. Reaumur, who made several trials upon this animal, has at least convinced the world that it is not necessarily, but by an effort, that the torpedo numbs the hand of him that touches it. He tried several times, and could easily tell when the fish intended the stroke, and when it was about to continue harmless. Always before the fish intended the stroke, it flattened the back, raised the head and the tail; and then, by a violent contraction in the opposite direction, struck with its back against the pressing finger; and the body, which before was flat, became humped and round.

But we must not infer, as he has done, that the whole effect of this animal's exertions arise from the greatness of the blow which the fingers receive at the instant they are struck. We will, with him, allow that the stroke is very powerful, equal to that of a musquet-ball, since he will have it so; but it is very well known, that a blow, though never so great on the points of the fingers, diffuses no numbness over the whole body: such a blow might break the ends of the fingers indeed, but would hardly numb the shoulder. Those blows that numb, must be applied immediately to some





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The Ray *V.6.p.248.* 2 The Torpedo. *V.6.p.207.*

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great and leading nerves, or to a large surface of the body; a powerful stroke applied to the points of the fingers will be excessively painful indeed, but the numbness will not reach beyond the fingers themselves. We must, therefore, look for another cause producing the powerful effects wrought by the torpedo.

Others have ascribed it to a tremulous motion which this animal is found to possess, somewhat resembling that of an horse's skin, when stung by a fly. This operating under the touch with an amazing quickness of vibration, they suppose produces the uneasy sensation described above; something similar to what we feel when we rub plush cloth against the grain. But the cause is quite disproportioned to the effect; and so much beyond our experience, that this solution is as difficult as the wonder we want to explain.

The most probable solution seems to be, that the shock proceeds from an animal electricity, which this fish has some hidden power of storing up, and producing on its most urgent occasions. The shocks are entirely similar; the duration of the pain is the same; but how the animal contrives to renew the charge, how it is prevented from evaporating it on contiguous objects, how

it is originally procured, these are difficulties that time alone can elucidate.

But to know even the effects is wisdom. Certain it is, that the powers of this animal seem to decline with its vigour; for as its strength ceases, the force of the shock seems to diminish; till, at last, when the fish is dead, the whole power is destroyed, and it may be handled or eaten with perfect security: on the contrary, when immediately taken out of the sea, its force is very great, and not only affects the hand, but if even touched with a stick, the person finds himself sometimes affected. This power, however, is not to be extended to the degree that some would have us believe; as reaching the fishermen at the end of the line, or numbing fishes in the same pond. Godignus, in his History of Abyssinia, carries this quality to a most ridiculous excess: he tells us of one of these that was put into a basket among a number of dead fishes, and that the next morning the people, to their utter astonishment, perceived, that the torpedo had actually numbed the dead fishes into life again.

To conclude, it is generally supposed that the female torpedo is much more powerful than the male. Lorenzini, who has made seve-

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ral experiments upon this animal, seems convinced that its power wholly resides in two thin muscles that cover a part of the back. These he calls the trembling fibres; and he asserts that the animal may be touched with safety in any other part. It is now known also that there are more fish than this of the ray kind, possessed of the numbing quality, which has acquired them the name of the torpedo. These are described by Atkins and Moore, and found in great abundance along the coast of Africa. They are shaped like a mackarel, except that the head is much larger; the effects of these seem also to differ in some respects. Moore talks of keeping his hand upon the animal; which in the ray torpedo it is actually impossible to do. "There was no man in the company," says he, "that could bear to keep his hand on this animal the twentieth part of a minute, it gave him so great pain: but upon taking the hand away, the numbness went off, and all was well again. This numbing quality continued in this torpedo even after it was dead; and the very skin was still possessed of its extraordinary power till it became dry." Condamine informs us of a fish possessed of the powers of the torpedo, of a shape very different from the former, and every way resembling a

Jamprey. This animal, if touched by the hand, or even with a stick, instantly benumbs the hand and arm to the very shoulder; and sometimes the man falls down under the blow. These animals, therefore, must affect the nervous system in a different manner from the former, both with respect to the manner and the intention; but how this effect is wrought, we must be content to dismiss in obscurity.

C H A P. IV.

Of the Lamprey and its Affinities.

TH E R E is a species of the Lamprey served up as a great delicacy among the modern Romans, very different from ours. Whether theirs be the murena of the ancients I will not pretend to say ; but there is nothing more certain than that our lamprey is not. The Roman lamprey agrees with the ancient fish in being kept in ponds, and considered by the luxurious as a very great delicacy.

The lamprey known among us is differently estimated, according to the season in which it is caught, or the place where it has been fed. Those that leave the sea to deposit their spawn in fresh waters are the best ; those that are entirely bred in our rivers, and that have never been at sea, are considered as much inferior to the former. Those that are taken in the months of March, April, or May, just upon their leaving the sea, are reckoned very good ; those that are caught after they have cast their spawn, are found to be flabby and of little value. Those caught in several of the rivers in Ireland the people will not venture to touch ; those

of the English Severn are considered as the most delicate of all other fish whatever.

The lamprey much resembles an eel in its general appearance, but is of a lighter colour, and rather a clumsier make. It differs however in the mouth, which is round, and placed rather obliquely below the end of the nose. It more resembles the mouth of a leech than an eel; and the animal has a hole on the top of the head through which it spouts water, as in the cetaceous kind. There are seven holes on each side for respiration; and the fins are formed rather by a lengthening out of the skin, than any set of bones or spines for that purpose. As the mouth is formed resembling that of a leech, so it has a property resembling that animal of sticking close to and sucking any body it is applied to. It is extraordinary the power they have of adhering to stones; which they do so firmly as not to be drawn off without some difficulty. We are told of one that weighed but three pounds; and yet it stuck so firmly to a stone of twelve pounds, that it remained suspended at its mouth, from which it was separated with no small difficulty. This amazing power of suction is supposed to arise from the animal's exhausting the air within its body by the hole over the nose, while the mouth is closely fixed

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to the object, and permits no air to enter. It would be easy to determine the weight this animal is thus able to sustain; which will be equal to the weight of a column of air of equal diameter with the fish's mouth.

From some peculiarity of formation, this animal swims generally with its body as near as possible to the surface; and it might easily be drowned by being kept by force for any time under water. Muralto has given us the anatomy of this animal; but, in a very minute description, makes no mention of lungs. Yet I am very apt to suspect, that two red glands tissued with nerves, which he describes as lying towards the back of the head, are no other than the lungs of this animal. The absolute necessity it is under of breathing in the air, convinces me that it must have lungs, though I do not know of any anatomist that has described them.

The adhesive quality in the lamprey may be in some measure encreased by that slimy substance with which its body is all over smeared; a substance that serves at once to keep it warm in its cold element, and also to keep its skin soft and pliant. This mucus is separated by two long lymphatic canals, that extend on each side from the head to the tail, and that furnish

it in great abundance. As to its intestines, it seems to have but one great bowel, running from the mouth to the vent, narrow at both ends, and wide in the middle.

So simple a conformation seems to imply an equal simplicity of appetite. In fact, the lam-prey's food is either slime and water, or such small water-insects as are scarce perceivable. Perhaps its appetite may be more active at sea, of which it is properly a native; but when it comes up into our rivers, it is hardly perceived to devour any thing.

Its usual time of leaving the sea, which it is annually seen to do in order to spawn, is about the beginning of spring; and after a stay of a few months it returns again to the sea. Their preparation for spawning is peculiar; their manner is to make holes in the gravelly bottom of rivers; and on this occasion their sucking power is particularly serviceable; for if they meet with a stone of a considerable size, they will remove it and throw it out. Their young are produced from eggs in the manner of flat fish; the female remains near the place where they are excluded, and continues with them till they come forth. She is sometimes seen with her whole family playing about her; and after some time she conducts them in triumph back to the ocean.

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But some have not sufficient strength to return; and these continue in the fresh water till they die. Indeed, the life of this fish, according to Rondeletius, who has given its history, is but of very short continuance; and a single brood is the extent of the female's fertility. As soon as she has returned after casting her eggs, she seems exhausted and flabby. She becomes old before her time; and two years is generally the limit of her existence.

However this may be, they are very indifferent eating after they have cast their eggs, and particularly at the approach of hot weather. The best season for them is the months of March, April, and May; and they are usually taken in nets with salmon, and sometimes in baskets at the bottom of the river. It has been an old custom for the city of Gloucester, annually to present the king with a lamprey-pye; and as the gift is made at Christmas, it is not without great difficulty the corporation can procure the proper quantity, though they give a guinea a piece for taking them.

How much they were valued among the ancients, or a fish bearing some resemblance to them, appears from all the classics that have praised good living, or ridiculed gluttony. One story we are told of this fish with which I will

conclude its history. A senator of Rome, whose name does not deserve being transmitted to posterity, was famous for the delicacy of his lampreys. Tigelinus, Manucius, and all the celebrated epicures of Rome, were loud in his praises: no man's fish had such a flavour, was so nicely fed, or so exactly pickled. Augustus, hearing so much of this man's entertainments, desired to be his guest; and soon found that fame had been just to his merits; the man had indeed very fine lampreys, and of an exquisite flavour. The emperor was desirous of knowing the method by which he fed his fish to so fine a relish; and the glutton, making no secret of his art, informed him that his way was to throw into his ponds such of his slaves as had at any time displeased him. Augustus, we are told, was not much pleased with his receipt, and instantly ordered all his ponds to be filled up. The story would have ended better if he had ordered the owner to be flung in also.

C H A P. VIII.

The Sturgeon and its Varieties.

THE Sturgeon, with a form as terrible and a body as large as the shark, is yet as harmless as the fish we have been just describing; incapable and unwilling to injure others, it flies from the smallest fishes, and generally falls a victim to its own timidity.

The sturgeon in its general form resembles a fresh-water pike. The nose is long; the mouth is situated beneath, being small, and without jaw-bones or teeth. But, though it is so harmless and ill provided for war, the body is formidable enough to appearance. It is long, pentagonal, and covered with five rows of large bony knobs, one row on the back, and two on each side, and a number of fins to give it greater expedition. Of this fish there are three kinds; the Common Sturgeon, the Caviar Sturgeon, and the Huso or Ikinglass fish. The first has eleven knobs or scales on the back; the second has fifteen; and the latter thirteen on the back and forty-three on the tail. These differences seem slight to us who only consider the animal's form; but those who consider its uses

find the distinction of considerable importance. The first is the sturgeon, the flesh of which is sent pickled into all parts of Europe. The second is the fish from the roe of which that noted delicacy called caviar is made; and the third, besides supplying the caviar, furnishes also the valuable commodity of isinglass. They all grow to a very great size; and some of them have been found above eighteen feet long.

There is not a country in Europe but what this fish visits at different seasons; it annually ascends the largest rivers to spawn, and propagates in an amazing number. The inhabitants along the banks of the Po, the Danube, and the Wolga, make great profit yearly of its incursions up the stream, and have their nets prepared for its reception. The sturgeon also is brought daily to the markets of Rome and Venice, and they are known to abound in the Mediterranean sea. Yet those fish that keep entirely either in salt or fresh water are but comparatively small. When the sturgeon enjoys the vicissitude of fresh and salt water, it is then that it grows to an enormous size, so as almost to rival even the whale in magnitude.

Nor are we without frequent visits from this much esteemed fish in England. It is often accidentally taken in our rivers in salmon-nets, and

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particularly in those parts that are not far remote from the sea. The largest we have heard of caught in Great-Britain was a fish taken in the Eske, where they are most frequently found, which weighed four hundred and fixty pounds. An enormous size to those who have only seen our fresh-water fishes !

North-America also furnishes the sturgeon ; their rivers, in May, June, and July, supply them in very great abundance. At that time they are seen sporting in the water, and leaping from its surface several yards into the air. When they fall again on their sides, the concussion is so violent, that the noise is heard in still weather at some miles distance.

But of all places where this animal is to be found, it appears no where in such numbers as in the Lakes of Frischehaff and Curischaff, near the city of Pillau. In the rivers also that empty themselves into the Euxine Sea this fish is caught in great numbers, particularly at the mouth of the river Don. In all these places the fishermen regularly expect their arrival from the sea, and have their nets and salt ready prepared for their reception.

As the sturgeon is an harmless fish and no way voracious, it is never caught by a bait in the ordinary manner of fishing, but always in

nets. From the description given above of its mouth, it is not to be supposed that the sturgeon would swallow any hook capable of holding so large a bulk and so strong a swimmer. In fact, it never attempts to seize any of the finny tribe, but lives by rooting at the bottom of the sea; where it makes insects and sea-plants its whole subsistence. From this quality of floundering at the bottom it has received its name; which comes from the German verb *floeren*, signifying to wallow in the mud. That it lives upon no large animals is obvious to all those who cut it open, where nothing is found in its stomach but a kind of slimy substance, which has induced some to think it lives only upon water and air. From hence there is a German proverb, which is applied to a man extremely temperate, when they say he is as moderate as a sturgeon.

As the sturgeon is so temperate in its appetites, so is it also equally timid in its nature. There would be scarce any method of taking it did not its natural desire of propagation induce it to incur so great a variety of dangers. The smallest fish is alone sufficient to terrify a shoal of sturgeons; for, being unfurnished with any weapon of defence, they are obliged to trust to their swiftness and their caution for security.

AN HISTORY OF

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 upon no large animals is obvious to all those
 who have seen it, where nothing is found in its
 stomach but a kind of stony substance, which
 is called *stony*. I think it lives only upon
 the small stones which are found in a German
 pond, which are called *stony*. It is extremely
 voracious, and will devour a man extremely
 small, and will devour a man extremely



...in its app-
 ...in its nature
 ...of taking it
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The Sturgeon.

The Myxus.

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Like all animals that do not make war upon others, sturgeons live in society among themselves; rather for the purposes of pleasure, than from any power of mutual protection. Gesner even asserts, that they are delighted with sounds of various kinds; and that he has seen them shoal together, at the notes of a trumpet.

The usual time, as was said before, for the sturgeon to come up rivers to deposit its spawn, is about the beginning of summer, when the fishermen of all great rivers make a regular preparation for its reception. At Pillau particularly the shores are formed into districts, and allotted to companies of fishermen, some of which are rented for about three hundred pounds a year. The nets in which the sturgeon is caught, are made of small cord, and placed across the mouth of the river; but in such a manner that, whether the tide ebbs or flows, the pouch of the net goes with the stream. The sturgeon thus caught, while in the water, is one of the strongest fishes that swims, and often breaks the net to pieces that encloses it; but the instant it is raised with its head above water, all its activity ceases: it is then a lifeless, spiritless lump, and suffers itself to be tamely dragged on shore. It has been found prudent, however, to draw it to shore gently; for, if

excited by any unnecessary violence, it has been found to break the fishermen's legs with a blow of its tail. The most experienced fishers, therefore, when they have drawn it to the brink, keep the head still elevated, which prevents its doing any mischief with the hinder part of the body : others, by a nooze, fasten the head and the tail together ; and thus without immediately dispatching it, bring it to the market, if there be one near ; or keep it till their number is completed for exportation.

The flesh of this animal pickled is very well known at all the tables of Europe ; and is even more prized in England than in any of the countries where it is usually caught. The fishermen have two different methods of preparing it. The one is by cutting it in long pieces lengthwise, and having salted them, by hanging them up in the sun to dry : the fish thus prepared is sold in all the countries of the Levant, and supplies the want of better provision. The other method, which is usually practised in Holland, and along the shores of the Baltic, is to cut the sturgeon crosswise into short pieces, and put it into small barrels, with a pickle made of salt and saumure. This is the sturgeon which is sold in England ; and of which great quantities came from the North,

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until we gave encouragement to the importation of it from North America. From thence we are very well supplied ; but it is said, not with such good fish as those imported from the north of Europe.

A very great trade is also carried on with the roe of the sturgeon, preserved in a particular manner, and called Caviar : it is made from the roe of all kinds of sturgeon, but particularly the second. This is much more in request in other countries of Europe than with us. To all these high relished meats, the appetites must be formed by degrees ; and though formerly even in England it was very much in request at the politest tables, it is at present sunk entirely into disuse. It is still, however, a considerable merchandize among the Turks, Greeks, and Venetians. Caviar somewhat resembles soft soap in consistence ; but it is of a brown, uniform colour, and is eaten as cheese with bread. The manner of making it is this : they take the spawn from the body of the sturgeon—for it is to be observed that the sturgeon differs from other cartilaginous fish, in that it has spawn like a cod, and not eggs like a ray.—They take the spawn, I say, and freeing it from the small membranes that connect it together, they wash it with vinegar, and afterward spread in

to dry upon a table ; they then put it into a vessel with salt, breaking the spawn with their hands, and not with a pestle ; this done, they put it into a canvas bag, letting the liquor drain from it ; lastly, they put it in a tub, with holes in the bottom, so that, if there be any moisture still remaining, it may run out : then it is pressed down, and covered up close for use.

But the Huso or Isinglass Fish furnishes a still more valuable commodity. This fish is caught in great quantities in the Danube, from the months of October to January : it is seldom under fifty pounds weight, and often above four hundred : its flesh is soft, glutinous and flabby ; but it is sometimes salted, which makes it better tasted, and then it turns red like salmon. It is for the commodity it furnishes that it is chiefly taken. Isinglass is of a whitish substance, enclining to yellow, done up into rolls, and so exported for use. It is very well known as serviceable not only in medicine, but many arts. The varnisher, the wine-merchant, and even the clothier know its uses ; and very great sums are yearly expended upon this single article of commerce. The manner of making it is this : they take the skin, the entrails, the fins and the tail of this fish, and cut them into small pieces ; these are left to macerate in a sufficient

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quantity of warm water, and they are all boiled shortly after with a slow fire, until they are dissolved and reduced to a jelly; this jelly is spread upon instruments made for the purpose, so, that drying, it assumes the form of parchment, and, when quite dry, it is then rolled into the form which we see it in the shops.

This valuable commodity is principally furnished from Russia, where they prepare great quantities surprisingly cheap. Mr. Jackson, an ingenious countryman of our own, found out an obvious method of making a glue at home that answered all the purposes of isinglass; but what with the trouble of making it, and perhaps the arts put in practice to undersell him, he was, as I am told, obliged to discontinue the improvement of his discovery. Indeed, it is a vain attempt to manufacture among ourselves those things which may be more naturally and cheaply supplied elsewhere. We have many trades that are unnaturally, if I may so express it, employed among us; who furnish more laboriously those necessities with which other countries could easily and cheaply supply us. It would be wiser to take what they can thus produce; and to turn our artizans to the increase and manufacture of such productions as thrive more readily among us. Were, for instance,

the number of hands that we have now employed in the manufacture of silk, turned to the encrease of agriculture, it is probable that the encreased quantity of corn thus produced, would be more than an equivalent for the diminution of national wealth in purchasing wrought silk from other countries.

C H A P. IX.

Of Anomalous Cartilaginous Fishes.

OF all others, the cartilaginous class seems to abound with the greatest variety of ill-formed animals, and, if philosophy could allow the expression, we might say, that the cartilaginous class was the class of monsters: in fact, it exhibits a variety of shapeless beings, the deviations of which from the usual form of fishes are beyond the power of words to describe, and scarcely of the pencil to draw. In this class we have the Pipe Fish, that almost tapers to a thread, and the Sun Fish, that has the appearance of a bulky head, but the body cut off in the middle; the Hippocampus, with an head somewhat like that of an horse, and the Water Bat, whose head can scarcely be distinguished from the body. In this class we find the

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Fishing Frog, which from its deformity some have called the Sea Devil, the Chimæra, the Lump Fish, the Sea Porcupine, and the Sea-Snail. Of all these the history is but little known; and naturalists supply the place with description.

The Sun Fish sometimes grows to a very large size; one taken near Plymouth was five hundred weight. In form it resembles a bream, or some deep fish cut off in the middle: the mouth is very small, and contains in each jaw two broad teeth, with sharp edges: the colour of the back is dusky and dappled, and the belly is of a silvery white. When boiled, it has been observed to turn to a glutinous jelly, and would most probably serve for all the purposes of isinglass, were it found in sufficient plenty.

The Fishing Frog in shape very much resembles a tadpole or young frog, but then a tadpole of enormous size, for it grows to above five feet long, and its mouth is sometimes a yard wide. Nothing can exceed its deformity. The head is much bigger than the whole body; the under jaw protects beyond the upper, and both are armed with rows of slender, sharp teeth: the palate and the tongue are furnished with teeth in like manner; the eyes are placed on the top of the head, and are encompassed with

prickles : immediately above the nose are two long beards or filaments, small in the beginning, but thicker at the end, and round : these, as it is said, answer a very singular purpose ; for being made somewhat resembling a fishing-line, it is asserted, that the animal converts them to the purposes of fishing. With these extended, as Pliny asserts, the fishing frog hides in muddy waters, and leaves nothing but the beards to be seen ; the curiosity of the smaller fish bring them to view these filaments, and their hunger induces them to seize the bait ; upon which the animal in ambush instantly draws in its filaments with the little fish that had taken the bait, and devours it without mercy. This story, though apparently improbable, has found credit among some of our best naturalists ; but what induces me to doubt the fact is, that there is another species of this animal that has no beards, which it would not want if they were necessary to the existence of the kind. Rondeletius informs us, that if we take out the bowels, the body will appear with a kind of transparence ; and that if a lighted candle be placed within the body, as in a lanthorn, the whole has a very formidable appearance. The fishermen, however, have in general a great regard for this ugly fish, as it is an enemy to the dog fish, the bodies of those

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ferce and voracious animals being often found in its stomach : whenever they take it, therefore they always set it at liberty.

The Lump Fish is trifling in size, compared to the former : its length is but sixteen inches, and its weight about four pounds ; the shape of the body is like that of a bream, deep, and it swims edgeways ; the back is sharp and elevated, and the belly flat ; the lips, mouth and tongue of this animal are of a deep red ; the whole skin is rough, with bony knobs, the largest row is along the ridge of the back ; the belly is of a bright crimson colour : but what makes the chief singularity in this fish, is an oval aperture in the belly, surrounded with a fleshy, soft substance, that seems bearded all round ; by means of this part it adheres with vast force to any thing it pleases. If flung into a pail of water, it will stick so close to the bottom, that on taking the fish by the tail, one may lift up pail and all, though it hold several gallons of water. Great numbers of these fish are found along the coasts of Greenland in the beginning of summer, where they resort to spawn. Their roe is remarkably large, and the Greenlanders boil it to a pulp for eating. They are extremely fat, but not admired in England, being both flabby and insipid.

The Sea Snail takes its name from the soft and unctuous texture of its body, resembling the snail upon land. It is almost transparent, and soon dissolves and melts away. It is but a little animal, being not above five inches long. The colour, when fresh taken, is of a pale brown, the shape of the body round, and the back-fin reaches all the way from the head to the tail. Beneath the throat is a round depression, of a whitish colour, surrounded by twelve brown spots, placed in a circle. It is taken in England at the mouths of rivers, four or five miles distant from the sea.

The body of the Pipe Fish, in the thickest part, is not thicker than a swan-quill, while it is above sixteen inches long. This is angular, but the angles being not very sharp, they are not discernible until the fish is dried. Its general colour is an olive brown, marked with numbers of bluish lines, pointing from the back to the belly. It is viviparous; for, on crushing one that was just taken, hundreds of very minute young ones were observed to crawl about.

The Hippocampus, which from the form of its head some call the Sea Horse, never exceeds nine inches in length. It is about as thick as a man's thumb, and the body is said, while alive, to have hair on the fore part, which falls off



C. Martin sc.

1 The Frog Fish. 2 The Sun Fish.

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when it is dead. The snout is a sort of a tube with a hole at the bottom, to which there is a cover, which the animal can open and shut at pleasure. Behind the eyes there are two fins, which look like ears; and above them are two holes, which serve for respiration. The whole body seems to be composed of cartilaginous rings, on the intermediate membranes of which several small prickles are placed. It is found in the Mediterranean, and also in the Western Ocean; and, upon the whole, more resembles a great caterpillar than a fish. The ancients considered it as extremely venomous; probably induced by its peculiar figure.

From these harmless animals, covered with a slight coat of mail, we may proceed to others, more thickly defended, and more formidably armed, whose exact station in the scale of fishes is not yet ascertained. While Linnæus ranks them among the Cartilaginous kinds, a later naturalist places them among the Spinous class. With which tribe they most agree, succeeding observations must determine. At present, we seem better acquainted with their figure than their history: their deformity is obvious; and the venomous nature of the greatest number, has been confirmed by fatal experience. This circumstance, as well as the happy distance

at which they are placed from us, being all found in the Oriental or American seas, may have prevented a more critical enquiry; so that we know but little of the nature of their malignity, and still less of their pursuits and enmities in the deep.

In the first of this tribe we may place the Sea Orb, which is almost round, has a mouth like a frog, and is from seven inches to two feet long. Like the porcupine, from whence it sometimes takes its name, being also called the Sea Porcupine, it is covered over with long thorns or prickles, which point on every side; and, when the animal is enraged, it can blow up its body as round as a bladder. Of this extraordinary creature there are many kinds: some threatening only with spines, as the Sea Hedge-hog; others defended with a bony helmet that covers the head, as the Ostracion; others with a coat of mail from the head to the tail, where it terminates in a point, as the Centriscus; and others still armed offensively and defensively with bones and spines, as the Shield Orb.

Of these scarce one is without its peculiar weapon of offence. The centriscus wounds with its spine; the ostracion poisons with its venom; the orb is impregnable, and is ab-

solutely poisonous, if eaten. Indeed, their figure is not such as would tempt one to make the experiment; and the natives of those countries where they are found, are careful to inform foreigners of their danger: yet a certain sailor at the Cape of Good Hope, not believing what the Dutch told him concerning their venom, was resolved to make the experiment, and break through a prejudice which he supposed was founded on the animal's deformity. He tried and eat one; but his rashness cost him his life; he instantly fell sick, and died a few days after.

These frightful animals are of different sizes; some not bigger than a foot-ball, and others as large as a bushel. They almost all flatten and erect their spines at pleasure, and encrease the terrors of their appearance in proportion to the approach of danger. At first they seem more inoffensive; their body oblong, with all their weapons pointing towards the tail; but upon being provoked or alarmed, the body that before seemed small swells to the view, the animal visibly grows rounder and larger, and all its prickles stand upright, and threaten the invader on every side. The Americans often amuse themselves with the barren pleasure of catching these frightful creatures by a line

and hook baited with a piece of sea-crab. The animal approaches the bait with its spines flattened; but when hooked and stopped by the line, straight all its spines are erected; the whole body being armed in such a manner at all points, that it is impossible to lay hold of it on any part. For this reason it is dragged to some distance from the water, and there it quickly expires. In the middle of the belly of all these there is a sort of bag or bladder filled with air, and by the inflation of which the animal swells itself in the manner already mentioned.

In describing the deformed animals of this class, one is sometimes at a loss whether it be a fish or an insect that lies before him. Thus the hippocampus and the pipe-fish bear a strong resemblance to the caterpillar and the worm; while the lesser orb bears some likeness to the class of sea-eggs to be described after. I will conclude this account of cartilaginous fishes with the description of an animal which I would scarcely call a fish, but that Father Labat dignifies it with the name. Indeed, this class teems with such a number of odd-shaped animals, that one is prompted to rank every thing extraordinary of the finny species among the number; but besides, Labat says its bones are cartilaginous, and that may entitle it to a place here.

The

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The animal I mean is the Galley Fish, which Linnaeus degrades into the insect tribe, under the title of the Medusa, but which I chuse to place in this tribe, from its habits, that are somewhat similar. To the eye of an unmindful spectator, this fish seems a transparent bubble swimming on the surface of the sea, or like a bladder variously and beautifully painted with vivid colours, where red and violet predominate, as variously opposed to the beams of the sun. It is however an actual fish; the body of which is composed of cartilages, and a very thin skin filled with air, which thus keeps the animal floating on the surface, as the waves and the winds happen to drive. Sometimes it is seen thrown on the shore by one wave, and again washed back into the sea by another. Persons who happen to be walking along the shore often happen to tread upon these animals; and the bursting of their body yields a report like that when one treads upon the swim of a fish. It has eight broad feet with which it swims, or which it expands to catch the air as with a sail. It fastens itself to whatever it meets by means of its legs, which have an adhesive quality. Whether they move when on shore Labat could never perceive, though he did every thing to make them stir; he only saw that it strongly adhered to

whatever substances he applied it. It is very common in America, and grows to the size of a goose-egg, or somewhat more. It is perpetually seen floating; and no efforts that are used to hurt it can sink it to the bottom. All that appears above water is a bladder clear and transparent as glass, and shining with the most beautiful colours of the rainbow. Beneath, in the water, are four of the feet already mentioned that serve as oars, while the other four are expanded above to sail with. But what is most remarkable in this extraordinary creature, is the violent pungency of the slimy substance with which its legs are smeared. If the smallest quantity but touch the skin, so caustic is its quality, that it burns it like hot oil dropped on the part affected. The pain is worst in the heat of the day, but ceases in the cool of the evening. It is from feeding on these that he thinks the poisonous quality contracted by some West-Indian fish may be accounted for. It is certain these animals are extremely common along all the coasts in the Gulf of Mexico; and whenever the shore is covered with them in an unusual manner, it is considered as a certain fore-runner of a storm.

OF

OF

SPINOUS FISHES.

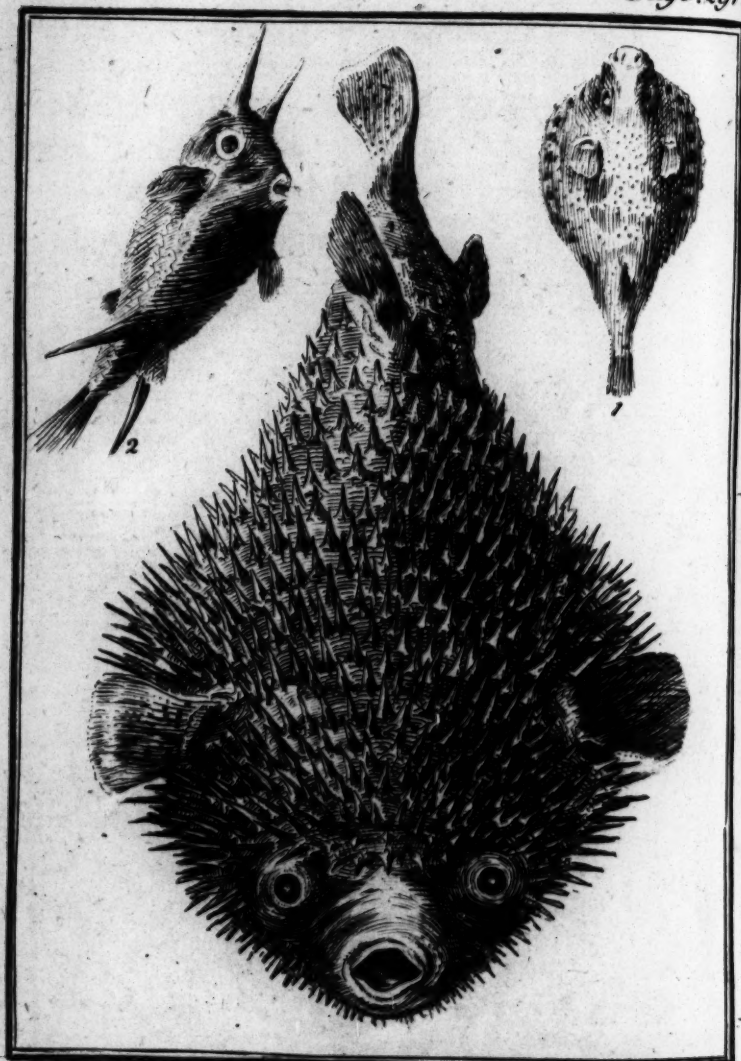
PART III.

U 2

PLANTING

PLANTING





The Sea Hedghog.

1 The Sea Orb.

2 The Ostracion.

C. Martin sculp.

C H A P. I.

The Division of Spinous Fishes.

THE third general division of fishes is into that of the Spinous or bony kind. These are obviously distinguished from the rest by having a complete bony covering to their gills; by their being furnished with no other method of breathing but gills only; by their bones, which are sharp and thorny; and their tails, which are placed in a situation perpendicular to the body. This is that class which alone our later naturalists are willing to admit as fishes. The Cetaceous class with them are but beasts that have taken up their abode in the ocean; the Cartilaginous class are an amphibious band, that are but half denizens of that element: it is fishes of the Spinous kind that really deserve the appellation.

This distinction the generality of mankind will hardly allow; but whatever be the justice of this preference in favour of the spinous class, it is certain that the cetaceous and cartilaginous classes bear no proportion to them in number. Of the spinous classes are already known above four hundred species; so that the numbers of the

former are trifling in comparison, and make not above a fifth part of the finny creation.

From the great variety in this class, it is obvious how difficult a task it must have been to describe or remember even a part of what it contains. When six hundred different sorts of animals offer themselves to consideration, the mind is bewildered in the multiplicity of objects that all lay some claim to its attention. To obviate this confusion, systems have been devised, which, throwing several fishes that agree in many particulars into one groupe, and thus uniting all into so many particular bodies, the mind that was incapable of separately considering each, is enabled to comprehend all when thus offered in larger masses to its consideration.

Indeed, of all the beings in animated nature, fishes most demand a systematical arrangement. Quadrupedes are but few, and can be all known; birds, from their seldom varying in their size, can be very tolerably distinguished without system; but among fishes, which no size can discriminate, where the animal ten inches and the animal ten feet long is entirely the same, there must be some other criterion by which they are to be distinguished; something that gives precision to our ideas of the animal whose history we desire to know.

Of the real history of fishes, very little is yet known; but of very many we have full and sufficient accounts, as to their external form. It would be unpardonable, therefore, in an history of these animals, not to give the little we do know; and, at least, arrange our forces, though we cannot tell their destination. In this art of arrangement, Artedi and Linnæus have long been conspicuous: they have both taken a view of the animal's form in different lights; and, from the parts which most struck them, have founded their respective systems.

Artedi, who was foremost, perceiving that some fishes had hard prickly fins, as the pike; that others had soft pliant ones, as the herring; and that others still wanted that particular fin, by which the gills are opened and shut, as the eel, made out a system from these varieties. Linnæus, on the other hand, rejecting this system, which he found liable to too many exceptions, considered the fins, not with regard to their substance, but their position. The ventral fins seem to be the great object of his system; he considers them in fishes supplying the same offices as feet in quadrupedes; and from their total absence, or from their being situated nearer the head or the tail, in different fishes, he takes the differences of his system.

These arrangements, which are totally arbitrary, and which are rather a method than a science, are always fluctuating; and the last is generally preferred to that which went before. There has lately appeared, however, a system, composed by Mr. Gouan of Montpellier, that deserves applause for more than its novelty. It appears to me the best arrangement of this kind that ever was made; and in it the divisions are not only precisely systematical, but in some measure adopted by nature itself. This learned Frenchman has united the systems of Artedi and Linnaeus together; and by bringing one to correct the other, has made out a number of tribes, that are marked with the utmost precision. A part of his system, however, we have already gone through in the cartilaginous, or, as he calls a part of them, the *branchiostegous* tribe of fishes. In the arrangement of these I have followed Linnaeus, as the number of them was but small, and his method simple. But in that which is more properly called the Spinous class of fishes, I will follow Mr. Gouan's system; the terms of which, as well as of all the former systems, require some explanation. I do not love to multiply the technical terms of a science; but it often happens that names, by being long used, are as necessary to be known as the science itself.

If we consider the substance of the fin of a fish, we shall find it composed, besides the skin, either of straight, hard, pointed, bony prickles or spines, as in the pike; or of soft, crooked, or forked bones, or cartilages, as in the herring. The fish that have bony prickly fins, are called Prickly-finned Fish; the latter, that have soft or cartilaginous fins, are called Soft-finned Fish. The prickly-finned fish have received the Greek new-formed name of *Acanthopterygii*; the soft-finned fish have likewise their barbarous Greek name of *Malacopterygii*. Thus far Artedi has supplied Mr. Gouan with names and divisions. All Spinous fish are divided into Prickly-finned fish, and Soft-finned fish.

Again, Linnæus has taught him to remark the situation of the fins: for the ventral or belly fins, which are those particularly to be remarked, are either wholly wanting, as in the eel, and then the fish is called *Apodal* (a Greek word signifying without feet); or the ventral fins are placed more forward than the pectoral fins, as in the haddock, and then the animal is called a *Jugular* fish; or the ventral fins are placed directly under the pectoral fins, as in the father-lasher, and then it is called a *Thoracic* fish: or, lastly, the ventral fins are placed

nearer the tail than the pectoral fins, as in the minnow, and then it is an *Abdominal* fish.

Possessed of these distributions, the French naturalist mixes and unites them into two grand divisions. All the prickly-finned fish make one general division; all the soft-finned fish another. These first are distinguished from each other, as being either *apodal*, *jugular*, *thoracic*, or *abdominal*. Thus there are prickly-finned *apodal* fishes; prickly-finned *jugular* fishes, prickly-finned *thoracic* fishes, and prickly-finned *abdominal* fishes. On the other hand, the soft-finned fishes fall under a similar distribution, and make the other general division. Thus there are soft-finned *apodal* fishes, soft-finned *jugular* fishes, soft-finned *thoracic* fishes, and soft-finned *abdominal* fishes. These general characters are strongly marked, and easily remembered. It only remains, therefore, to divide these into such tribes as are most strongly marked by nature; and to give the distinct characters of each, to form a complete system with great simplicity. This Mr. Gouan has done; and the tribes into which he has distributed each of these divisions, exactly amount to fifty. Thus the reader, who can contain in his memory the characteristic marks of fifty kinds, will have a tolerable idea of the form of every kind of spinous fish. I say, of the form; for

as to the history and the nature of the animal itself, that can only be obtained by experience and information.

PRICKLY-FINNED FISHES.

PRICKLY-FINNED APODAL FISH.

1. THE *Trichurus*. The body of a sword-form; the head oblong; the teeth sword-like, bearded near the points; the fore-teeth largest; the fin that covers the gills with seven spines; the tail ending in a point without fins; an inhabitant near the Oriental and American shores; of a silvery white; frequently leaping into the fishermen's boats in China.

2. The *Xiphias* or *Sword-fish*. The body round; the head long; the upper-jaw terminating by a long beak, in form of a sword; the fin that covers the gills with six spines; an inhabitant of Europe; an enemy to the whale.

3. The *Ophidium* or *Gilt-head*. The body sword-like; the head blunt; the fin covering the gills with seven spines; the opening of the mouth side-ways; the fins of the back, the anus, and the tail all joining together; the most beautiful of all fishes, covered over with green, gold, and silver; it is by sailors

called the dolphin, and gives chase to the flying fish.

PRICKLY-FINNED JUGULAR FISH.

4. THE *Trachinus* or *Weever*. The body oblong; the head obtuse; the bones covering the gills jagged at the bottom; the fins covering the gills with six spines; the anus near the breast; buries itself in the sands, leaving only its nose out; and if trod, immediately strikes with the spines that form its dorsal fins, which are venomous and dangerous.

5. The *Uranoscopus*. The body wedge-like; the head almost round, and larger than the body; the mouth flat; the eyes on the top of the head; the fin covering the gills with five spines; the anus in the middle of the body; an inhabitant of the Mediterranean Sea.

6. The *Callyonymus* or *Dragonet*. The body almost wedge-like; the head broad, and larger than the body; the mouth even with the body; the bony covering of the gills close shut; the opening to the gills behind the head; the fin covering the gills with six spines; an inhabitant of the Atlantic Ocean.

7. The *Blennius* or *Blenny*. The body oblong; the head obtusely bevil; the teeth a single

range; the fin covering the gills with six spines; the ventral fins have two small blunt bones in each; a species of this animal is viviparous.

PRICKLY-FINNED THORACIC FISHES.

8. *The Gobius or Gudgeon.* The body round and oblong; the head with two little holes between the eyes, one before the other; the fin covering the gills with six spines; the ventral fins joined together.

9. *The Cepola.* The body sword-like; the head blunt; the mouth flat; the fin covering the gills with six spines; the fins distinct; an inhabitant of the Mediterranean Sea.

10. *The Coryphæna or Razor-fish.* The body wedge-like; the head very bevil; the fin covering the gills with five spines.

11. *The Scomber or Mackarel.* The body oblong; the line running down the side zigzagged towards the tail; the head sharp and small; the fins covering the gills with six spines; several false fins towards the tail.

12. *The Labrus or Wrasse.* The body oval; the head middling; the lips doubled inward; both cutting and grinding teeth; the covers

of the gills scaly; the fin covering the gills with five spines; the pectoral fins pointed.

13. The *Sparus* or *Sea-bream*. The body oblong; the head middling; the lips not inverted; the teeth cutting and grinding; the cover of the gills scaly; the fins covering the gills with five rays; the pectoral fins pointed.

14. The *Chætodon* or *Cat-fish*. The body oblong; the head small; the teeth slender and bending; the fin covering the gills with five or six spines; the fins of the back and anus scaly.

15. The *Sciæna*. The body nearly elliptical; the head bevil; the covers of the fins scaly; the fin covering the gills with six rays; the fins of the back jagged, and hidden in a furrow in the back.

16. The *Perch*. The body oblong; the head bevil; the covers of the gills scaly and toothed; the fin covering the gills with seven spines; the fins in some jagged.

17. The *Scorpena* or *Father-lasber*. The body oblong; the head great, with beards; the covers of the gills armed with prickles; the fin covering the gills with seven spines.

18. The *Mullus* or *Surmulet*. The body slender; the head almost four-cornered; the fin covering the gills with three spines; some of these have beards; a fish highly prized by the

Romans, and still considered as a very great delicacy.

19. The *Trigla* or the *Gurnard*. The body slender; the head nearly four-cornered, and covered with a bony coat; the fin covering the gills with seven spines; the pectoral and ventral fins, strengthened with additional muscles and bones, and very large for the animal's size.

20. The *Cottus* or *Bull-head*. The body wedge-like; the head flat and broader than the body; the fin covering the gills with six spines; the head furnished with prickles, knobs, and beards.

21. The *Zeus* or *Doree*. The body oblong; the head large, bevil; the fin covering the gills with seven rays; the fins jagged; the upper-jaw with a loose floating skin depending into the mouth.

22. The *Thracipterus* or *Sabre*. The body sword-like; the head bevil; the fin covering the gills with six spines; the lateral line straight; the scales in a single order; a loose skin in both the jaws.

23. The *Gasterosteus* or *Stickleback*. The body broadest towards the tail; the head oblong; the fin covering the gills with three spines; prickles starting backward before the back fins and the fins of the anus.

PRICKLY-FINNED ABDOMINAL FISH.

24. THE *Silurus* or *Sheat-fish*. The body oblong; the head large; the fin covering the gills from four to fourteen spines; the leading bones or spines in the back and pectoral fins toothed.

25. The *Mugil* or *Mullet*. The body oblong; the head almost conical; the upper jaw with a furrow, which receives the prominence of the under; the fin covering the gills with seven rays.

26. The *Polynemus*. The body oblong; the head with a beak; the fin covering the gills with from five to seven spines; the bones that move the pectoral fins not articulated to those fins.

27. The *Theutys*. The body almost elliptical; the head abruptly shortened; the fin covering the gills with five rays; the teeth in a single row, close, strong, and even.

28. The *Elops* or *Sea-serpent*. The body slender; the head large; the fin covering the gills double with thirty spines, and armed externally with five bones resembling teeth.

SOFT-FINNED FISHES.

SOFT-FINNED APODAL FISHES.

29. THE *Muraena* or *Eel*. The body round and slender; the head terminating in a beak; the fin covering the gills with ten rays; the opening to the gills pipe-fashion, placed near the pectoral fins; the fins of the back, the anus, and the tail, united in one.

30. The *Gymnotus* or *Carapo*. The body broadest on the back, like the blade of a knife; the head small; the fin covering the gills with five rays; the back without a fin; two beards or filaments from the upper lip; an inhabitant of Brasil.

31. The *Anarhicas* or *Wolf-fish*. The body roundish and slender; the head large and blunt; the fore-teeth above and below conical; the grinding-teeth and those in the palate round; the fin covering the gill has six rays.

32. The *Stromateus*. The body oblong; the head small; the teeth moderately sharp; the fin covering the gills with five or six rays.

33. The *Ammodytes* or *Launce*. The body slender and roundish; the head terminated by a beak; the teeth of a hair-like fineness; the fin covering the gills with seven rays.

SOFT-FINNED JUGULAR FISHES.

34. THE *Lepadogaster*. The body wedge-like; the head oblong, forwarder than the body, flattish, the beak resembling that of a duck; the pectoral fins double, two on each side; the ventral fins joined together; a kind of bony-breast-plate between the pectoral fins; the fin covering the gills with five rays; the opening to the gills pipe-fashion.

35. The *Gadus* or *Cod-fish*. The body oblong; the head wedge-like; the fin covering the gills with seven rays; several back and anal fins.

SOFT-FINNED THORACIC FISHES.

36. THE *Plemonectes* or *Flumide*. The body elliptical; the head small; both eyes on one side of the head; the fin covering the gills with from four to seven rays.

37. The *Echeneis* or *Sucking-fish*. The body almost wedge-like, moderately round; the head broader than the body; the fin covering the gills with ten rays; an oval breast-plate, streaked in form of a ladder, toothed.

38. The *Lipidopus* or the *Garter-fish*. The

body sword-like; the head lengthened out; the fins covering the gills with seven rays; three scales only on the whole body; two in the place of the ventral fins; the third from that of the anus.

SOFT-FINNED ABDOMINAL FISH.

39. *The Loricaria.* The body crufted over; the head broad, with a beak; no teeth; the fin covering the gills with fix rays.

40. *The Atherina* or *Atherine.* The body oblong; the head of a middling fize; the lips indented; the fin covering the gills with fix rays; the line on the fides refembling a filver band.

41. *The Salmo* or *Salmon.* The body oblong; the head a little fharp: the fin covering the gills from four to ten rays; the laft fin on the back, without its correspondent mufcles, fat.

42. *The Fiftularia.* The body angular, in form of a fpindle; the head pipe-fafhion, with a beak; the fin covering the gills with feven rays; the under jaw covering the upper.

43. *The Efox* or *Pike.* The body round; the head with a beak; the under-jaw pierced longitudinally with fmall holes; the fin covering the gills with from feven to twelve rays.

44. The *Argentina* or *Argentine*. The body a little round and slender; the head with a beak, broader than the body; the fin covering the gills with eight rays; a spurious back fin.

45. The *Clupea* or *Herring*. The body a little oblong; the head with a small beak; the fin covering the gills with eight rays.

46. The *Exocetas* or *Flying-fish*. The body oblong; the head almost three-cornered; the fin covering the gills with ten rays; the pectoral fins placed high, and as long as the whole body; the back fin at the extremity of the back.

47. The *Cyprinus* or *Carp*. The body elongated, almost round; the head with a small beak; the hinder part of the bone covering the gills, marked with a crescent; the fin covering the gills with three rays.

48. The *Cobitis* or *Loach*. The body oblong; almost equally broad throughout; the head small, a little elongated; the eyes in the hinder part of the head; the fin covering the gills from four to six rays; the covers of the gills closed below.

49. The *Amia* or *Bonito*. The body round and slender; the head, forehead, and breast, without skin; the fin covering the gills with twelve rays; two beards from the nose.

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50. The *Mormyrus*. The body oblong; the head elongated; the fin covering the gills with a single ray; the opening to the gills is linear, and has no bone covering them.

Such is the system of Mr. Gouan; by reducing to which any fish that offers, we can know its rank, its affinities, and partly its anatomy, all which make a considerable part in its natural history. But, to shew the use of this system still more apparently, suppose I meet with a fish, the name to me unknown, of which I desire to know something more. The way is first to see whether it be a cartilaginous fish, which may be known by its wanting fins to open and shut the gills, which the cartilaginous kinds are wholly without. If I find that it has them, then it is a spinous fish; and, in order to know its kind, I examine its fins, whether they be prickly or soft: I find them soft; it is therefore to be ranked among the soft-finned fishes. I then examine its ventral or belly-fins, and finding that the fish has them, I look for their situation, and find they lie nearer to the tail than the pectoral fins. By this I find the animal to be a soft-finned abdominal fish. Then, to know which of the kinds of these fishes it is, I examine its figure and the shape of its head, I find the body rather oblong; the head with a

small beak; the lower jaw like a saw; the fin covering the gills with eight rays. This animal must therefore be the herring, or one of that family, such as the pilchard, the sprat, the shad, or the anchovy. To give another instance; Upon examining the fins of a fish to me unknown, I find them prickly; I then look for the situation of the ventral fins, I find them entirely wanting; this then must be a prickly-finned apodal fish. Of this kind there are but three; and by comparing the fish with the description, I find it either of the trichurus kind, the sword-fish, or the gilt-head, Upon examining also its internal structure, I shall find a very great similitude between my fish and that placed at the head of the family.

C H A P. II.

Of Spinous Fishes in General.

HAVING given a method by which spinous fishes may be distinguished from each other, the history of each in particular might naturally be expected to follow: but such a distinct account of each would be very disgusting, from the unavoidable uniformity of every description. The history of any one of this class very much resembles that of all the rest: they breathe air and water through the gills; they live by rapine, each devouring such animals as its mouth is capable of admitting; and they propagate, not by bringing forth their young alive, as in the cetaceous tribes, nor by distinct eggs, as in the generality of the cartilaginous tribes, but by spawn, or peas, as they are generally called, which they produce by hundreds of thousands. These are the leading marks that run through their whole history, and which have so much swelled books with tiresome repetition.

It will be sufficient therefore to draw this numerous class into one point of view, and to mark how they differ from the former classes; and what they possess peculiarly striking, so as

to distinguish them from each other. The first object that presents itself, and that by which they differ from all others, are the bones. These, when examined but slightly, appear to be entirely solid; yet, when viewed more closely, every bone will be found hollow, and filled with a substance less rancid and oily than marrow. These bones are very numerous, and pointed; and, as in quadrupedes, are the props or stays to which the muscles are fixed, which move the different parts of the body.

The number of bones in all spinous fishes of the same kind, is always the same. It is a vulgar way of speaking to say, that fishes are at some seasons more bony than at others; but this scarce requires contradiction. It is true indeed, that fish are at some seasons much fatter than at others; so that the quantity of the flesh being diminished, and that of the bones remaining the same, they appear to encrease in number, as they actually bear a greater proportion.

All fish of the same kind, as was said, have the same number of bones: the skeleton of a fish, however irregularly the bones may fall in our way at table, has its members very regularly disposed; and every bone has its fixed place, with as much precision as we find in the orders of a regular fabric. But then spinous fish differ

in the number of bones according to the species; for some have a greater number of fins by which they move in the water. The number in each is always in proportion to the number and size of these fins; for every fish has a regular apparatus of bones and muscles, by which the fins are moved; and all those fish where they are numerous or large, must, of consequence, be considerably bony. Indeed, in the larger fish, the quantity of flesh is so much, and the bones themselves are so large, that they are easily seen and separated: but in the smaller kinds with many fins, the bones are as numerous as in the great; yet being so very minute, they lurk almost in every part of the flesh, and are dangerous as well as troublesome to be eaten. In a word, those fish which are large, fat, and have few fins, are found to be the least bony; those which are small, lean, and have many fins, are the most bony of all others. Thus, for instance, a roach appears more bony than a carp, because it is leaner and smaller; and it is actually more bony than an eel, because it has a greater number of fins.

As the spinous fish partake less of the quadrupede in their formation than any others, so they can bear to live out of their own element a shorter time. In general, when taken out of

the water, they testify their change by panting more violently and at closer intervals, the thin air not furnishing their gills the proper play; and in a few minutes they expire. Some indeed are more vivacious in air than others; the eel will live several hours out of water; and the carp has been known to be fattened in a damp cellar. The method is by placing it in a net well wrapped up in wet moss, the mouth only out, and then hung up in vault. The fish is fed with white bread and milk; and the net now and then plunged into the water. The animal, thus managed, has been known not only to live for a fortnight, but to grow exceedingly fat, and of a superior flavour. From this it would seem, that the want of moisture in the gills, is the chief cause of the death of these animals; and could that be supplied, their lives might be prolonged in the air, almost as well as in their own element.

Yet it is impossible to account for the different operations of the same element, upon animals, that, to appearance, have the same conformation. To some fishes, bred in the sea, fresh water is immediate destruction: on the other hand, some fishes, that live in our lakes and ponds, cannot bear the salt water. Whence this difference can arise, is not easy to be accounted

for. The saline quality of the water cannot properly be given as the cause; since no fishes imbibe any of the sea's saltiness with their food, or in respiration. The flesh of all fishes is equally fresh, both in the river, and at the saltiest depths of the ocean; the salt of the element in which they live no way mixing with their constitution. Whence then is it that animals will live only there, and will quickly expire when carried into fresh water? It may probably arise from the superior weight of the sea water. As from the great quantity of salt dissolved in its composition, it is much heavier than fresh water, so it is probable it lies with greater force upon the organs of respiration, and gives them their proper and necessary play: on the other hand, those fish which are used only to fresh water, cannot bear the weight of the saline fluid, and expire in a manner suffocated in the grossness of the strange element.

But though there are some tribes that live only in the sea, and others only in fresh water, yet there are some whose organs are equally adapted to either element; and that spend a part of their season in one, and a part in the other. Thus the salmon, the shad, the smelt, and the flounder, annually quit their native ocean, and come up our rivers to deposit their

spawn. This seems the most important business of their lives; and there is no danger which they will not encounter, even to the surmounting precipices, to find a proper place for the deposition of their future offspring. The salmon, upon these occasions, is seen to ascend rivers five hundred miles from the sea; and to brave not only the danger of various enemies, but also to spring up cataracts as high as a house. As soon as they come to the bottom of the torrent, they seem disappointed to meet the obstruction, and swim some paces back: they then take a view of the danger that lies before them, survey it motionless for some minutes, advance, and again retreat; till at last summoning up all their force, they take a leap from the bottom, their body straight, and strongly in motion; and thus most frequently clear every obstruction. It sometimes happens, however, that they want strength to make the leap; and then, in our fisheries, they are taken in their descent. But this is one of the smallest dangers that attend these adventuring animals in their progress: numberless are the methods of taking them; as well by the hook, as by nets, baskets, and other inventions, which it is not our business here to describe. Their capture makes, in several countries, a great article of commerce; and being cured in several different

manners, either by salting, pickling, or drying, they are sent to all the markets of Europe.

As these mount up the rivers to depofite their spawn, others, particularly the eel, defcend the fresh-water fream, as Redi affures us, to bring forth their young in the fea. About the month of Auguft, annually, thefe animals take the opportunity of the moft obfcure nights, and when the rivers are flooded by accidental rains, feek the ocean. When they have reached the fea, and produced their young, for they are viviparous, they again afcend the fream, at different times, as opportunity offers, or as the feafon is favourable or tempeftuous. Their paffage begins ufually about the end of January, and continues till towards the end of May, when they are taken in the river Arno by millions, and fo fmall that a thoufand of them goes to a pound. There is nothing more certain than that they defcend in our own rivers after floods, in great abundance, and are thus caught in nets, to very great advantage. They are poffeffed alfo of a power of climbing over any obftacle; for, by applying their glutinous and flimy bodies to the furface of the object they defire to furmount, they can thus creep up locks, weirs, and every thing that would prevent their afcending the current of the fream.

But the length of the voyage performed by these fishes, is sport, if compared to what is annually undertaken by some tribes, that constantly reside in the ocean. These are known to take a course of three or four thousand miles in a season; serving for prey to whales, sharks, and the numerous flocks of water-fowl, that regularly wait to intercept their progress. These may be called fish of passage, and bear a strong analogy to birds of passage, both from their social disposition, and the immensity of their numbers. Of this kind are the cod, the haddock, the whiting, the mackarel, the tunny, the herring and the pilchard. Other fish live in our vicinity, and reside on our coasts all the year round; or keep in the depths of the ocean, and are but seldom seen: but these, at stated seasons, visit their accustomed haunts with regular certainty, generally returning the same week in the succeeding year, and often the same day.

The stated returns, and the regular progress of these fish of passage, is one of the most extraordinary circumstances in all the history of nature. What it is that impels them to such distant voyages; what directs their passage; what supports them by the way; and what sometimes prompts them to quit, for several seasons, one shore for another, and then return

to their accustomed harbour ; are questions that curiosity may ask, but philosophy can hardly resolve. We must dismiss enquiry, satisfied with the certainty of the facts.

The cod seems to be the foremost of this wandering tribe ; and is only found in our northern part of the world. This animal's chief place of resort is on the banks of Newfoundland, and the other sand-banks that lie off Cape-Breton. That extensive flat seems to be no other than the broad top of a sea-mountain, extending for above five hundred miles long, and surrounded with a deeper sea. Hither the cod annually repair in numbers beyond the power of calculation, to feed on the quantity of worms that are to be found there in the sandy bottom. Here they are taken in such quantities, that they supply all Europe with a considerable share of provision. The English have stages erected all along the shore for salting and drying them ; and the fishermen, who take them with the hook and line, which is their method, draw them in as fast as they can throw out. This immense capture, however, makes but a very small diminution, when compared to their numbers ; and when their provision there is exhausted, or the season for propagation returns, they go off to the polar seas, where they depo-

sift their roes in full security. From thence want of food forces them, as soon as the first more southern seas are open, to repair southward for subsistence. Nor is this fish an unfrequent visitant upon our own shores: but the returns are not so regular, nor does the capture bear any proportion to that at Newfoundland.

The haddock, the whiting, and the mackarel, are thought, by some, to be driven upon our coasts rather by their fears than their appetites; and it is to the pursuit of the larger fishes, we owe their welcome visits. It is much more probable, that they come for that food which is found in more plenty near the shore, than farther out at sea. One thing is remarkable, that their migrations seem to be regularly conducted. The grand shoal of haddocks that comes periodically on the Yorkshire coasts, appeared there in a body on the 10th of December, 1766; and exactly on the same day, in the following year. This shoal extended from the shore near three miles in breadth, and in length for more than forty. The limits of a shoal are precisely known; for if the fishermen put down their lines at the distance of more than three miles from shore, they catch nothing but dog-fish: a proof that the haddock is not there.

But of all migrating fish, the herring and the pilchard take the most adventurous voyages.

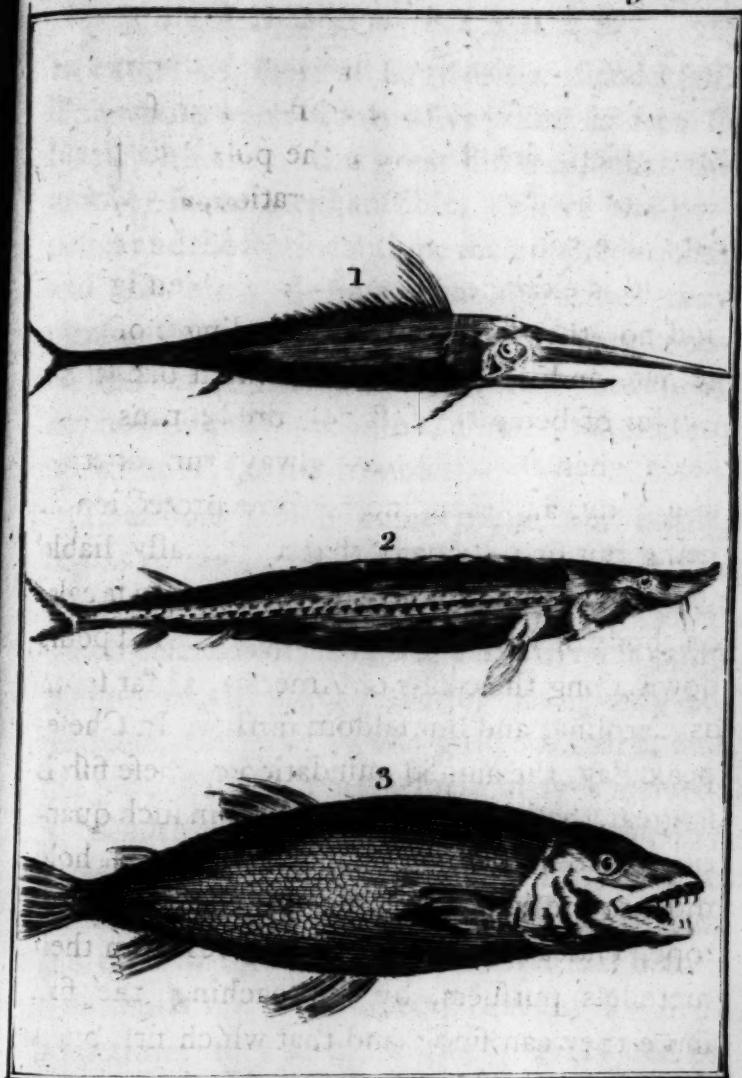
Herrings

Herrings are found in the greatest abundance in the highest northern latitudes. In those inaccessible seas, that are covered with ice for a great part of the year, the herring and pilchard find a quiet and sure retreat from all their numerous enemies : thither neither man, nor their still more destructive enemy, the fin-fish, or the cachalot, dares to pursue them. The quantity of insect food which those seas supply, is very great; whence, in that remote situation, defended by the icy rigour of the climate, they live at ease, and multiply beyond expression. From this most desirable retreat, Anderson supposes, they would never depart, but that their numbers render it necessary for them to migrate; and, as with bees from a hive, they are compelled to seek for other retreats.

For this reason, the great colony is seen to set out from the icy sea about the middle of winter; composed of numbers, that if all the men in the world were to be loaded with herrings, they would not carry the thousandth part away. But they no sooner leave their retreats, but millions of enemies appear to thin their squadrons. The fin-fish and the cachalot swallow barrels at a yawn; the porpoisses, the grampus, the shark, and the whole numerous tribe of dog-fish, find them an easy prey, and

desist from making war upon each other : but still more, the unnumbered flocks of sea-fowl that chiefly inhabit near the pole, watch the outset of their dangerous migration, and spread extensive ruin.

In this exigence, the defenceless emigrants find no other safety but by crouding closer together, and leaving to the outmost bands the danger of being the first devoured ; thus, like sheep when frightened, that always run together in a body, and each finding some protection in being but one of many that are equally liable to invasion, they are seen to separate into shoals, one body of which moves to the west, and pours down along the coasts of America, as far south as Carolina, and but seldom farther. In Chespeak Bay, the annual inundation of these fish is so great, that they cover the shores in such quantities as to become a nuisance. Those that hold more to the east, and come down towards Europe, endeavour to save themselves from their merciless pursuers, by approaching the first shore they can find ; and that which first offers in their descent, is the coast of Iceland, in the beginning of March. Upon their arrival on that coast, their phalanx, which has already suffered considerable diminutions, is nevertheless of amazing extent, depth, and closeness, covering



1. The Sword Fish.

C. Martin sculp.

2. The Sturgeon.

3. A Salmon.



an extent of shore as large as the island itself. The whole water seems alive; and is seen so black with them to a great distance, that the number seems inexhaustible. There the porpoises and the shark continue their depredations; and the birds devour what quantities they please. By these enemies the herrings are cooped up into so close a body, that a shovel, or any hollow vessel put into the water, takes them up without farther trouble.

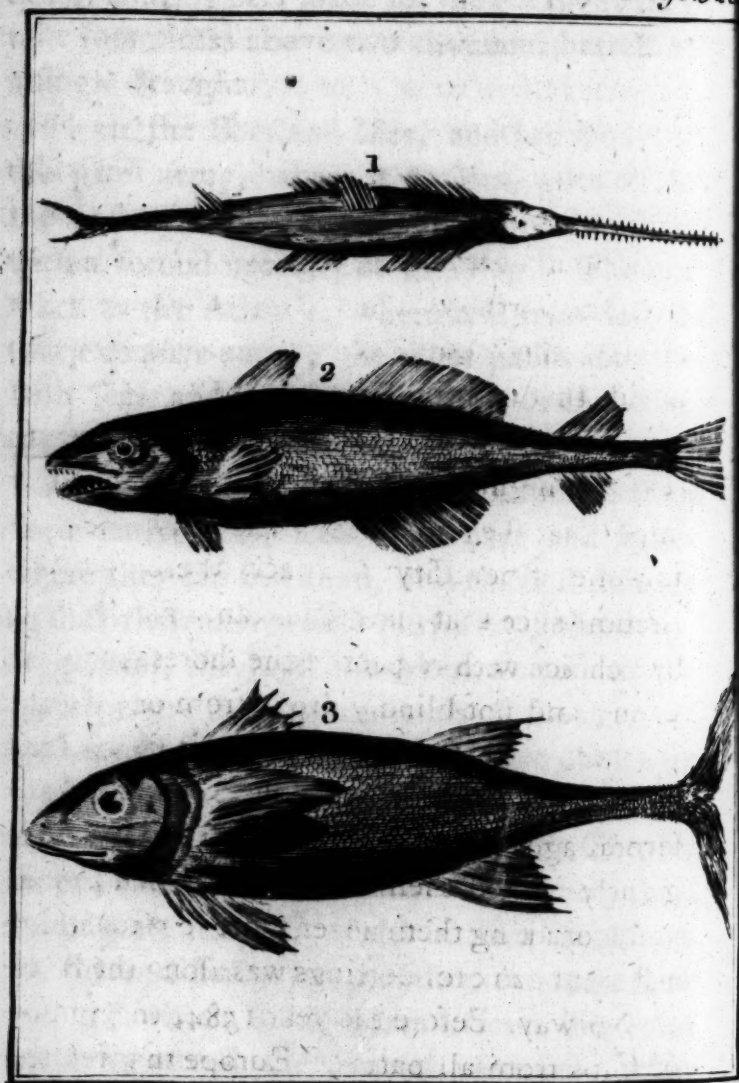
That body which comes upon our coasts, begins to appear off the Shetland Isles in April. These are the forerunners of the grand shoal which descends in June; while its arrival is easily announced, by the number of its greedy attendants, the gannet, the gull, the shark, and the porpoises. When the main body is arrived, its breadth and depth is such as to alter the very appearance of the ocean. It is divided into distinct columns, of five or six miles in length, and three or four broad; while the water before them curls up, as if forced out of its bed. Sometimes they sink for the space of ten or fifteen minutes, then rise again to the surface; and, in bright weather, reflect a variety of splendid colours, like a field bespangled with purple, gold and azure. The fishermen are ready prepared to give them a proper recep-

tion; and, by nets made for the occasion, they take sometimes above two thousand barrels at a single draught.

From the Shetland Isles, another body of this great army, where it divides, goes off to the western coasts of Ireland, where they meet with a second necessity of dividing. The one takes to the Atlantic, where it is soon lost in that extensive ocean; the other passes into the Irish sea, and furnishes a very considerable capture to the natives.

In this manner, the herrings, expelled from their native seas, seek those bays and shores where they can find food, and the best defence against their unmerciful pursuers of the deep. In general, the most inhabited shores are the places where the larger animals of the deep are least fond of pursuing, and these are chosen by the herring as an asylum from greater dangers. Thus, along the coasts of Norway, the German shores, and the northern shores of France, these animals are found punctual in their visitations. In these different places they produce their young; which, when come to some degree of maturity attend the general motions. After the destruction of such numbers, the quantity that attempts to return is but small; and Anderson doubts whether they ever return.





1. The Saw Fish.

2. The Cod Fish.

3. The Tunny.

C. Martin sculp.

Such is the account given of the migration of these fishes, by one who, of all others, was best acquainted with their history; and yet many doubts arise, in every part of the migration. The most obvious which has been made is, that though such numbers perish in their descent from the north, yet, in comparison to those that survive, the account is trifling: and it is supposed, that of those taken by man, the proportion is not one to a million. Their regularly leaving the shore also at a stated time, would imply that they are not in these visits under the impulse of necessity. In fact, there seems one circumstance that shews these animals governed by a choice with respect to the shores they pitch upon; and not blindly drove from one shore to another. What I mean is, their fixing upon some shores for several seasons, or indeed, for several ages together; and, after having regularly visited them every year, then capriciously forsaking them never more to return. The first great bank for herrings was along the shores of Norway. Before the year 1584, the number of ships from all parts of Europe that resorted to that shore, exceeded some thousands. The quantity of herrings that were then assembled there, was such, that a man who should put a spear in the water, as Olaus Magnus asserts,

would see it stand on end, being prevented from falling. But soon after that period, these animals were seen to desert the Norway shores, and took up along the German coast, where the Hanse-towns drove a very great trade by their capture and sale; but, for above a century, the herrings have, in a great measure, forsaken them; and their greatest colonies are seen in the British channel, and upon the Irish shores. It is not easy to assign a cause for this seemingly capricious desertion; whether the number of their finny enemies encreasing along the northern coasts, may have terrified the herring tribe from their former places of resort; or, whether the quantity of food being greater in the British channel, may not allure them thither, is not easy to determine!

The pilchard, which is a fish differing little from the herring, makes the coast of Cornwall its place of principal resort. Their arrival on that coast is soon proclaimed by their attendants the birds, and the larger fishes; and the whole country prepare to take the advantage of this treasure, providentially thrown before them. The natives sometimes enclose a bay of several miles extent with their nets called *saines*. To direct them in their operations, there were some years ago (but I believe they are discontinued) several

men placed on eminencies near the shore, called *buers*, who, with brooms in their hands, gave signals where the nets were to be extended, and where the shoals of fishes lay : this they perceived by the colour of the water, which assumed a tincture from the shoals beneath. By these means they sometimes take twelve or fifteen hundred barrels of pilchards at a draught; and they place them in heaps on the shore. It often happens, that the quantity caught exceeds the salt or the utensils for curing them; and then they are carried off to serve for the purposes of manure. This fishery employs not only great numbers of men at sea, training them to naval affairs, but also numbers of women and children at land, in salting and curing the fish; in making boats, nets, ropes, and casks, for the purposes of taking or fitting them for sale. The poor are fed with the superfluity of the capture; the land is manured with the offals; the merchant finds the gain of commission, and honest commerce; the fisherman a comfortable subsistence from his toil. “Ships,” says Dr. Borlase, “are often freighted hither with salt, and into foreign countries with the fish, carrying off at the same time a part of our tin. The usual produce of the number of hogf-heads exported for ten years, from 1747 to

“ 1756 inclusive, amounted to near thirty thousand hogheads each year : every hoghead has amounted, upon an average, to the price of one pound, thirteen shillings and three-pence. Thus the money paid for pilchards exported, has annually amounted to near fifty thousand pounds.”

Whence these infinite numbers are derived, still remains obscure ; but it will encrease our wonder to be told, that so small a fish as the stickleback, which is seldom above two inches long, and that one would think could easily find support in any water, is yet obliged to colonize, and leave its native fens in search of new habitations. Once every seventh or eighth year, amazing shoals of these appear in the river Welland, near Spalding, and come up the stream, forming one great column. They are supposed to be multitudes collected in some of the fens, till overcharged with numbers, they are periodically obliged to migrate. An idea may be had of their numbers, when we are informed, that a man, employed by a farmer to take them, for the purpose of manuring his grounds, has got, for a considerable time, four shillings a day, by selling them at a halfpenny a bushel !

Thus we see the amazing propagation of

fishes along our own coasts and rivers; but their numbers bear no proportion to the vast quantities found among the islands of the Indian ocean. The inhabitants of these countries are not under the necessity even of providing instruments for fishing; it is but going down to the shore, and there the fish are found in great numbers in the plashees that still continue to have water in them. In some of these places the quantity is so great, that they are left in shoals, on those swamps, dried up by the sun, and their putrefaction contributes to render the country unhealthy.

This power of encreasing in these animals, exceeds our idea, as it would, in a very short time, outstrip all calculation. A single herring, if suffered to multiply unmolested and undiminished for twenty years, would shew a progeny greater in bulk than ten such globes as that we live upon. But happily the balance of nature is exactly preserved; and their consumption is equal to their fecundity. For this reason we are to consider the porpessie, the shark, or the cod-fish, not in the light of plunderers and rivals, but of benefactors to mankind. Without their assistance, the sea would soon become overcharged with the burthen of its own productions; and that element, which at

present distributes health and plenty to the shore, would but load it with putrefaction.

In the propagation of all fish some degree of warmth seems absolutely necessary, not only to their preservation, but to the advancement of their posterity. Their spawn is always deposited in those places where the sun-beams may reach them, either at the bottom of shallow shores, or floating on the surface in deeper waters. A small degree of heat answers all the purposes of incubation, and the animal issues from the egg in its state of perfect formation, never to undergo any succeeding change.

Yet still, I have some doubts whether most fish come from the egg completely formed. We know that in all the frog tribe, and many of the lizard kind, they are produced from the egg in an imperfect form. The tadpole, or young frog, with its enormous head and slender tail, are well known; a species of the lizard also, which is excluded from the shell without legs, only acquires them by degrees, and not till after some time does it put off its serpent form. It is probable that some kinds of fish in like manner suffer a change; and though it be too inconsiderable to strike the fisherman or the inattentive spectator, yet it makes a very material difference to the naturalist, and would perhaps

disarrange his most favourite systems. A slight alteration in the fins or bones that cover the gills would overturn the whole fabric of the most applauded ichthyologist; and yet, as I observed, it is most probable that these minute alterations often take place.

As a proof of this, during the month of July, there appear near Greenwich innumerable shoals of small fishes, which are known to the Londoners by the name of White Bait. It is universally agreed that they are the young of some fish: they are never seen but at this time of the year, and never found to have any roe, a circumstance that proves their not being come to maturity. The quantity is amazing; and the fish that produces them in such numbers must be in plenty, though it is not yet known what that fish is, as they correspond with no other species whatever. They most resemble the smelt in form; and yet they want a fin, which that animal is never without. They cannot be the bleak, as they are never found in other rivers where the bleak breed in great abundance. It is most probable, therefore, that they are the young of some animal not yet come to their perfect form, and therefore reducible to no present system.

The time that spinous fishes continue in the

pea is in proportion to the size of the kind. It is a rule that chiefly holds through nature, that the larger the animals are, the longer they continue before exclusion. This I say holds generally through all nature; though it is not easy to assign a cause for so well known a truth. It may probably be, that as all large bodies take a longer time to grow hot than small ones, so the larger the egg, the longer influence of vital warmth it requires to reach through all its recesses, and to unfold the dormant springs that wait to be put into motion.

The manner in which the eggs of fishes are impregnated is wholly unknown. All that obviously offers is, that in ponds the sexes are often seen together among the long grass at the edge of the water; that there they seem to struggle; and that during this time they are in a state of suffering; they grow thin; they lose their appetite, and their flesh becomes flabby; the scales of some grow rough, and they lose their lustre. On the contrary, when the time of coupling is over, their appetite returns; they re-assume their natural agility, and their scales become brilliant and beautiful.

Although the usual way with spinous fishes is to produce by spawn; yet there are some, such as the eel and the blenny, that are known to bring forth their young alive. Bowlker, who

has written a treatise upon fishing, seems to determine the question relative to the viviparous production of eels, upon the authority of one or two credible witnesses. An eel, opened in the presence of several persons of credit, was found to have an infinite number of little creatures, closely wrapped up together in a lump about the size of a nutmeg, which being put into a basin of water, soon separated, and swam about : yet still, whether these may not have been worms generated in the animal's body, remains a doubt ; for there are scarce any fishes that are not infested with worms in that manner.

With respect to the growth of fishes, it is observed, that among carps, particularly the first year, they grow to about the size of the leaf of a willow-tree ; at two years, they are about four inches long. They grow but one inch more the third season, which is five inches. Those of four years old are about six inches ; and seven after the fifth. From that to eight years old they are found to be large in proportion to the goodness of the pond, from eight to twelve inches. With regard to sea-fish, the fishermen assure us that a fish must be six years old before it is fit to be served up to table. They instance it in the growth of a mackarel.

They assure us that those a year old are as large as one's finger; that those of two years, are about twice that length; at three and four years, they are that small kind of mackarel that have neither melts nor rows; and between five and six, they are those full grown fish that are served up to our tables. In the same manner, with regard to flat fishes, they tell us that the turbot and barble at one year are about the size of a crown piece; the second year as large as the palm of one's hand; and at the fifth and sixth year, they are large enough to be served up to table. Thus it appears that fish are a considerable time in coming to their full growth, and that they are a long time destroyed before it comes to their turn to be destroyers*.

All fish live upon each other, in some state of their existence. Those with the largest mouths, attack and devour the larger kinds; those whose mouths are less, lie in wait for the smaller fry; and even these chiefly subsist upon spawn. Of those which live in the ocean of the spinous kinds, the Dorado is the most voracious. This is chiefly found in the tropical climates; and is at once the most active, and the most beautiful of the

* *Traité des Pêches, par Monsieur Duhamel. Sect. 3. p. 190.*

finny region. It is about six feet long; the back all over enamelled with spots of a blueish green and silver; the tail and fins of a gold colour; and all have a brilliancy of tint, that nothing but Nature's pencil can attain to: the eyes are placed on each side of the head, large and beautiful, surrounded with circles of shining gold. In the seas where they are found, these fish are always in motion, and play round ships in full sail, with ease and security: for ever either pursuing or pursued, they are seen continually in a state of warfare; either defending themselves against the shark, or darting after the smaller fishes. Of all others, the Flying-fish most abounds in these seas; and as it is a small animal, seldom growing above the size of a herring, it is chiefly sought by the dorado. Nature has furnished each respectively with the powers of pursuit and evasion. The dorado being above six feet long, yet not thicker than a salmon, and furnished with a full complement of fins, cuts it way through the water with amazing rapidity: on the other hand, the flying-fish is furnished with two pair of fins longer than the body, and these also moved by a stronger set of muscles than any other. This equality of power seems to furnish one of the most entertaining spectacles those seas can

exhibit. The efforts to seize on the one side, and the arts of escaping on the other, are perfectly amusing. The dorado is seen, upon this occasion, darting after its prey, which will not leave the water, while it has the advantage of swimming, in the beginning of the chase. But, like an hunted hare, being tired at last, it then has recourse to another expedient for safe, by flight. The long fins, which began to grow useless in the water, are now exerted in a different manner and different direction to that in which they were employed in swimming: by this means the timid little animal rises from the water, and flutters over its surface, for two or three hundred yards, till the muscles employed in moving the wings, are enfeebled by that particular manner of exertion. By this time, however, they have acquired a fresh power of renewing their efforts in the water, and the animal is capable of proceeding with some velocity by swimming: still, however, the active enemy keeps it in view, and drives it again from the deep; till, at length, the poor little creature is seen to dart to shorter distances, to flutter with greater effort, and to drop down at last into the mouth of its fierce pursuer. But not the dorado alone, all animated nature seems combined against this little fish, which
seems

seems possessed of double powers, only to be subject to greater dangers. For though it should escape from its enemies of the deep, yet the tropic bird and the albatross are for ever upon the wing to seize it. Thus pursued in either element, it sometimes seeks refuge from a new enemy; and it is not unfrequent for whole shoals of them to fall on ship-board, where they furnish man with an object of useless curiosity.

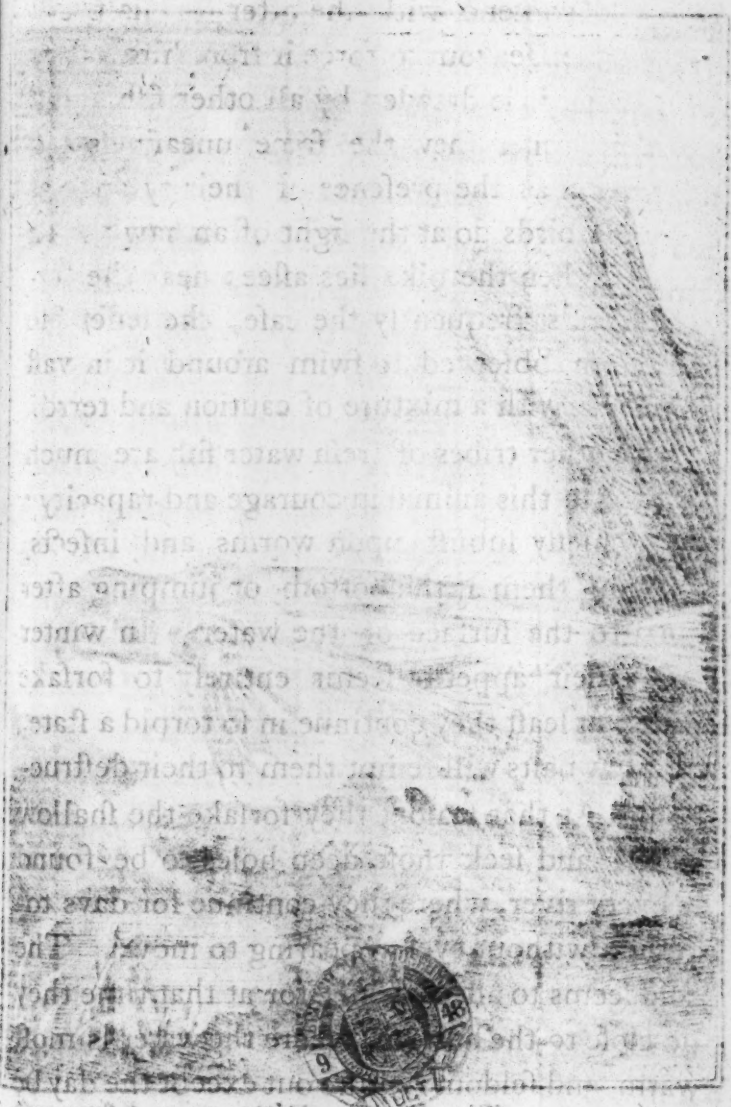
The warfare in fresh-water is not carried on with such destructive activity; nor are the inhabitants of that element so numerous. It would seem that there is something more favourable to the fecundity of fishes in the ocean, than in an element less impregnated with salt. It has been the opinion of some philosophers, that all fish are natives of that great reservoir; and that only colonies have been sent up rivers, either through accident, or the necessity of procuring subsistence. They have been led to this opinion by the superior fecundity of sea-fish, which breed twenty to one; as well as by their superiority in strength and size, over those of the same kind found in lakes and rivers. This is a matter too remotely speculative to be worth pursuing; but certain it is, that, in fresh water, fishes seem to abate much of their courage and rapacity; pursue

each other with less violence, and seem to be less powerfully actuated by all their appetites. The greediness with which sea-fish devour the bait is prodigious, if compared with the manner they take it in fresh water. The lines of such fishermen as go off to sea, are coarse, thick, and clumsy, compared to what are used by those who fish at land. Their baits are seldom more than a piece of a fish, or the flesh of some quadrupede, stuck on the hook in a bungling manner; and scarce any art is employed to conceal the deception. But it is otherwise in fresh water; the lines must often be drawn to an hair-like fineness; they must be tinged of the peculiar colour of the stream; the bait must be formed with the nicest art, and even, if possible, to exceed the perfection of nature: yet still the fishes approach it with diffidence, and often swim round it with disdain. The cod, on the banks of Newfoundland, the instant the hook, which is only baited with the guts of the animal last taken, is dropped into the water, darts to it at once, and the fishermen have but to pull up as fast as they throw down. But it is otherwise with those who fish in fresh waters, they must wait whole hours in fruitless expectation; and *the patience of a fisherman* is proverbial among us.

This comparative neglect of food, which is found in all the tribes of fresh water fishes, renders them less turbulent and less destructive among each other. Of all these the pike is the most active and voracious; and our poets, whose business it is to observe the surface of nature, have called it the tyrant of the watery plain. In fact, in proportion to its strength and celerity, the pike does some mischief; but what are its efforts, compared to those of the cachalot or the shark! they resemble the petty depredations of a robber, put in competition with the ravages of a conqueror! However, the pike will attack every fish less than itself; and it is sometimes seen choaked, by attempting to swallow such as are too large a morsel. It is immaterial of what species the animal it pursues appears to be, whether of another or its own; all are indiscriminately devoured; so that every fish owes its safety to its minuteness, its celerity, or its courage: nor does the pike confine itself to feed on fish and frogs; it will draw down the water-rat and the young ducks, as they are swimming about. Gesner tells us of a mule that stooped to drink in the water, when a famished pike, that was near, seized it by the nose, nor was it disengaged till the beast flung it on shore. So great is their rapacity, that

they will contend with the otter for his prey, and even endeavour to force it from him. For this reason it is dreaded by all other fish; and the small ones shew the same uneasiness and detestation at the presence of their tyrant, as the little birds do at the sight of an hawk or an owl. When the pike lies asleep near the surface, as is frequently the case, the lesser fish are often observed to swim around it in vast numbers, with a mixture of caution and terror.

The other tribes of fresh water fish are much inferior to this animal in courage and rapacity: they chiefly subsist upon worms and insects, pursuing them at the bottom, or jumping after them to the surface of the water. In winter also, their appetite seems entirely to forsake them; at least they continue in so torpid a state, that few baits will tempt them to their destruction. At that season, they forsake the shallow water, and seek those deep holes to be found in every river, where they continue for days together, without ever appearing to move. The cold seems to affect them; for at that time they lie close to the bottom, where the water is most warm, and seldom venture out except the day be peculiarly fine, and the shallows at the edges of the stream become tepid by the powerful rays of the sun. Indeed, I have been assured, that



about my feet and the shadows at the base of
the screen become tinged by the powerful rays
of the sun. Indeed, I have been assured that



The Flying Fish.

C. Martin sculp.

SPINOUS FISHES. 341

some fishes may be rendered so torpid by the cold, in the northern rivers, as to be frozen up, in the great masses of ice, in which they continue for several months together, seemingly without life or sensation, the prisoners of congelation, and waiting the approach of a warmer sun, to restore them at once to life and liberty. Thus that chearful luminary not only distributes health and vegetation to the productions of the earth, but is ardently sought even by the gelid inhabitants of the water.

As fish are enemies one to another, so each species is infested with worms of different kinds, peculiar to itself. The great fish abound with them; and the little ones are not entirely free. These troublesome vermin lodge themselves either in the jaws, and the intestines internally, or near the fins without. When fish are healthy and fat, they are not much annoyed by them; but in winter, when they are lean or sickly, they then suffer very much.

Nor does the reputed longevity of this class secure them from their peculiar disorders. They are not only affected by too much cold, but there are frequently certain dispositions of the element in which they reside, unfavourable to their health and propagation. Some ponds they will not breed in, however

artfully disposed for supplying them with fresh recruits of water, as well as provision. In some seasons they are found to feel epidemic disorders, and are seen dead by the water-side, without any apparent cause: yet still they are animals of all others the most vivacious, and they often live and subsist upon such substances as are poisonous to the more perfect classes of animated nature.

It is not easy to determine whether the poisonous qualities which many of them are found to possess, either when they wound our bodies externally with their spines, or when they are unwarily eaten at our tables, arises from this cause. That numbers of fishes inflict poisonous wounds, in the opinion of many, cannot be doubted. The concurrent testimony of mankind, they think sufficient to contradict any reasonings upon this head, taken from anatomical inspection. The great pain that is felt from the sting given by the back fin of the weever, bears no proportion to the smallness of the instrument that inflicts the wound. How the poison is preserved, or how it is conveyed by the animal, it is not in our power to perceive; but its actual existence has been often attested by painful experience. In this instance we must decline conjecture, satisfied with history.

The fact of their being poisonous when eaten, is equally notorious ; and the cause equally inscrutable. My poor worthy friend Dr. Grainger, who resided for many years at St. Christopher's, assured me, that of the fish caught, of the same kind, at one end of the island, some were the best and most wholesome in the world ; while others taken at a different end, were always dangerous, and most commonly fatal. We have a paper in the Philosophical Transactions, giving an account of the poisonous qualities of those found at New Providence, one of the Bahama islands. The author there assures us, that the greatest part of the fish of that dreary coast, are all of a deadly nature : their smallest effects being to bring on a terrible pain in the joints, which, if terminating favourably, leaves the patient without any appetite for several days after. It is not those of the most deformed figure, or the most frightful to look at, that are alone to be dreaded ; all kinds, at different times, are alike dangerous ; and the same species which has this day served for nourishment, is the next, if tried, found to be fatal !

This noxious quality has given rise to much speculation, and many conjectures. Some have supposed it to arise from the fishes on these shores eating of the machinel apple, a deadly

vegetable poison, that sometimes grows pendent over the sea ; but the quantity of those trees, growing in this manner, bears no proportion to the extensive infection of the fish. Labat has ascribed it to their eating the gally fish, which is itself most potently poisonous ; but this only removes our wonder a little farther back ; for it may be asked, with as just a cause for curiosity, how comes the gally fish itself to procure its noxious qualities ? Others have ascribed the poison of these fishes to their feeding upon coperas beds : but I do not know of any copper mines found in America. In short, as we cannot describe the alembic by which the rattle-snake distils its malignity, nor the process by which the scorplon, that lives among roses, converts their sweets to venom, so we cannot discover the manner by which fishes become thus dangerous ; and it is well for us of Europe that we can thus wonder in security. It is certain that, with us, if fishes, such as carp or tench, acquire any disagreeable flavour from the lakes in which they have been bred, this can be removed, by their being kept some time in finer and better water : there they soon clear away all those disagreeable qualities their flesh had contracted, and become as delicate as if they had been always fed in the most cleanly

manner. But this expedient is with us rather the precaution of luxury, than the effect of fear; we have nothing to dread from the noxious qualities of our fish; for all the animals our waters furnish are wholesome.

Happy England! where the sea furnishes an abundant and luxurious repast, and the fresh waters an innocent and harmless pastime; where the angler, in chearful solitude, strolls by the edge of the stream, and fears neither the coiled snake, nor the lurking crocodile; where he can retire at night, with his few trouts, to borrow the pretty description of old Walton, to some friendly cottage, where the landlady is good, and the daughter innocent and beautiful; where the room is cleanly, with lavender in the sheets, and twenty ballads stuck about the wall! There he can enjoy the company of a talkative brother sportsman, have his trouts dressed for supper, tell tales, sing old tunes, or make a catch! There he can talk of the wonders of nature with learned admiration, or find some harmless sport to content him, and pass away a little time, without offence to God, or injury to man!

OF
Crustaceous and Testaceous

F I S H E S.

P A R T IV.

Crustaceans and Testaceans

of the Division of Shell Fish.

describing the inhabitants of the water, & animals occur, that masking, from the of their tendency have been content to do, but that unaccountable, from their to, have justly agreed to be necessary of and. Indeed the animals of this class, the historian who ranks them rather as However, the common language of a they may not distinguish the & things may remain, if the philosopher is to give precision to our ideas of them there are two classes of animals, according to adding the water, which commonly receive the of the water, and those we have been describing, and altogether distinct from each other. These are divided by naturalists into Crustaceans and Testaceans animals: both totally unlike fishes to appearance, seem to invert the order of nature; and as those have their bones on the inside, and their muscles hanging from them for the purposes of life and motion, these on the contrary, have all their bones part on

the outside, and all their muscles within. Not to talk mysteriously, all who have seen a lobster or an oyster, perceive that the shell in these

C H A P. I. Of the Division of Shell Fish.

IN describing the inhabitants of the water, a class of animals occur, that mankind, from the place of their residence, have been content to call fish; but that naturalists, from their formation, have justly agreed to be unworthy of the name. Indeed, the affinity many of this kind bear to the insect tribe, may very well plead for the historian who ranks them rather as insects. However, the common language of a country must not be slightly invaded; the names of things may remain, if the philosopher be careful to give precision to our ideas of them.

There are two classes of animals, therefore, inhabiting the water, which commonly receive the name of fishes, entirely different from those we have been describing, and also very distinct from each other. These are divided by naturalists into Crustaceous and Testaceous animals: both, totally unlike fishes to appearance, seem to invert the order of nature; and as those have their bones on the inside, and their muscles hung upon them for the purposes of life and motion, these, on the contrary, have all their bony parts on

the outside, and all their muscles within. Not to talk mysteriously—all who have seen a lobster or an oyster, perceive that the shell in these bears a strong analogy to the bones of other animals; and that, by these shells, the animal is sustained and defended.

Crustaceous fish, such as the crab and the lobster, have a shell not quite of a stony hardness, but rather resembling a firm crust, and in some measure capable of yielding. Testaceous fishes, such as the oyster or cockle, are furnished with a shell of a stony hardness; very brittle, and incapable of yielding. Of the crustaceous kinds are the Lobster, the Crab, and the Tortoise: of the testaceous, that numerous tribe of Oysters, Muscles, Cockles, and Sea Snails, which offer with infinite variety.

The crustaceous tribe seem to hold the middle rank between fishes, properly so called, and those snail like animals that receive the name of testaceous fishes. Their muscles are strong and firm, as in the former; their shell is self-produced, as among the latter. They have motion, and hunt for food with great avidity, like the former. They are incapable of swimming, but creep along the bottom, like the latter: in short, they form the link that unites these classes, that seem so very opposite in their natures.

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Of testaceous fishes we will speak hereafter. As to animals of the crustaceous kind, they are very numerous, their figure offers an hundred varieties : but as to their nature, they are obviously divided into two very distinct kinds, differing in their habits and their conformation. The chief of one kind is the Lobster ; the chief of the other, the Tortoise. Under the Lobster we rank the Prawn, the Cray Fish, the Shrimp, the Sea Crab, the Land Crab, and all their varieties. Under the Sea Tortoise, the Turtle, the Hawksbill Turtle, the Land Tortoise, and their numerous varieties.

CHAP.

CHAP. II.

Crustaceous Animals of the Lobster Kind.

HOWEVER different in figure the lobster and the crab may seem, their manners and conformation are nearly the same. With all the voracious appetites of fishes, they are condemned to lead an insect life at the bottom of the water; and though pressed by continual hunger, they are often obliged to wait till accident brings them their prey. Though without any warmth in their bodies, or even without red blood circulating through their veins, they are animals wonderfully voracious. Whatever they seize upon that has life, is sure to perish, though never so well defended: they even devour each other: and, to encrease our surprize still more, they may, in some measure, be said to eat themselves; as they change their shell and their stomach every year, and their old stomach is generally the first morsel that serves to glut the new.

The lobster is an animal of so extraordinary a form, that those who first see it are apt to mistake the head for the tail; but it is soon discovered that the animal moves with its claws foremost; and that the part which plays
within

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within itself by joints, like a coat of armour, is the tail. The two great claws are the lobster's instruments of provision and defence; these, by opening like a pair of nippers, have great strength, and take a firm hold; they are usually notched, like a saw, which still more encreases their tenacity. Beside these powerful instruments, which may be considered as arms, the lobster has eight legs, four on each side; and these, with the tail, serve to give the animal its progressive and sideling motion. Between the two claws is the animal's head, very small, and furnished with eyes that seem like two black horny specks on each side; and these it has a power of advancing out of the socket, and drawing in at pleasure. The mouth, like that of insects, opens the long way of the body; not crossways, as with man, and the higher race of animals. It is furnished with two teeth for the comminution of its food; but as these are not sufficient, it has three more in the stomach; one on each side, and the other below. Between the two teeth there is a fleshy substance, in the shape of a tongue. The intestines consist of one long bowel, which reaches from the mouth to the vent; but what this animal differs in from all others, is, that the spinal marrow is in the breast-bone. It is furnished with two long

feelers or horns, that issue on each side of the head, that seem to correct the dimness of its sight, and apprize the animal of its danger, or of its prey. The tail, or that jointed instrument at the other end, is the grand instrument of motion; and with this it can raise itself in the water. Under this we usually see lodged the spawn in great abundance; every pea adhering to the next by a very fine filament, which is scarcely perceivable. Every lobster is an hermaphrodite, and is supposed to be self-impregnated! The ovary, or place where the spawn is first produced, is backwards, toward the tail, where a red substance is always found, and which is nothing but a cluster of peas, that are yet too small for exclusion. From this receptacle there go two canals, that open on each side at the jointures of the shell, at the belly; and through these passages the peas descend to be excluded, and placed under the tail, where the animal preserves them from danger for some time, until they come to maturity; when, being furnished with limbs and motion, they drop off into the water.

When the young lobsters leave the parent, they immediately seek for refuge in the smallest clefts of rocks, and in such-like crevices at the bottom of the sea, where the entrance is but small, and the opening can be easily defended.

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There, without seeming to take any food, they grow larger in a few weeks time, from the mere accidental substances which the water washes to their retreats. By this time also they acquire an hard, firm shell, which furnishes them with both offensive and defensive armour. They then begin to issue from their fortresses, and boldly creep along the bottom, in hopes of meeting with more diminutive plunder. The spawn of fish, the smaller animals of their own kind, but chiefly the worms that keep at the bottom of the sea, supply them with plenty. They keep in this manner close among the rocks, busily employed in scratching up the sand with their claws for worms, or surprising such heedless animals as fall within their grasp : thus they have little to apprehend, except from each other ; for in them, as among fishes, the large are the most formidable of all other enemies to the small.

But this life of abundance and security is soon to have a most dangerous interruption ; for the body of the lobster still continuing to encrease, while its shell remains inalterably the same, the animal becomes too large for its habitation, and imprisoned within the crust that has naturally gathered round it, there comes on a necessity of getting free. The young of this

kind, therefore, that grow faster, as I am assured by the fishermen, change their shell oftener than the old, who come to their full growth, and who remain in the same shell often for two years together. In general, however, all these animals change their shell once a year; and this is not only a most painful operation, but also subjects them to every danger. Their molting season is generally about the beginning of summer; at which time their food is in plenty, and their strength and vigour in the highest perfection. But soon all their activity ceases: they are seen forsaking the open parts of the deep, and seeking some retired situation among the rocks, or some outlet where they may remain in safety from the attacks of their various enemies. For some days before their change, the animal discontinues its usual voraciousness; it is no longer seen laboriously harrowing up the sand at the bottom, or fighting with others of its kind, or hunting its prey; it lies torpid and motionless, as if in anxious expectation of the approaching change. Just before casting its shell, it throws itself upon its back, strikes its claws against each other, and every limb seems to tremble; its feelers are agitated, and the whole body is in violent motion: it then swells itself in an unusual manner,

and at last the shell is seen beginning to divide at its junctures; particularly it opens at the junctures of the belly, where, like a pair of jumps, it was before but seemingly united. It also seems turned inside out; and its stomach comes away with its shell. After this, by the same operation, it disengages itself of the claws, which burst at the joints; the animal, with a tremulous motion, casting them off as a man would kick off a boot that was too big for him.

Thus, in a short time, this wonderful creature finds itself at liberty; but in so weak and enfeebled a state, that it continues for several hours motionless. Indeed, so violent and painful is the operation, that many of them die under it; and those which survive, are in such a weakly state for some time, that they neither take food, nor venture from their retreats. Immediately after this change, they have not only the softness, but the timidity of a worm. Every animal of the deep is then a powerful enemy, which they can neither escape nor oppose; and this, in fact, is the time when the dog-fish, the cod, and the ray, devour them by hundreds. But this state of defenceless imbecility continues for a very short time: the animal, in less than two days, is seen to have the skin that covered

its body grown almost as hard as before; its appetite is seen to encrease; and, strange to behold! the first object that tempts its gluttony, is its own stomach, which it so lately was disengaged from. This it devours with great eagerness; and some time after eats even its former shell. In about forty-eight hours, in proportion to the animal's health and strength, the new shell is perfectly formed, and as hard as that which was but just thrown aside.

To contribute to the speedy growth of the shell, it is supposed by some, that the lobster is supplied with a very extraordinary concretion within its body, that is converted into the shelly substance. It is a chalky substance, found in the lower part of the stomach of all lobsters, improperly called crab's eyes, and sold under that title in the shops. About the time the lobster quits its shell, the teeth in its stomach break these stones to pieces, and the fluids contained therein dissolve them. This fluid, which still remains in the new stomach, is thought to be replete with a petrifying quality, proper for forming a new shell: however, the concreting power that first formed these, shews a sufficient power in the animal to produce also the shell; and it is going but a short way in the causes of things, when we attempt to explain one wonder by another.

When the lobster is completely equipped in its new shell, it then appears how much it has grown in the space of a very few days; the dimensions of the old shell being compared with those of the new, it will be found that the creature is encreased above a third in its size; and, like a boy that has outgrown his cloaths, it seems wonderful how the deserted shell was able to contain so great an animal as entirely fills up the new.

The creature thus furnished, not only with a complete covering, but also a greater share of strength and courage, ventures more boldly among the animals at bottom; and not a week passes that in its combats it does not suffer some mutilation. A joint, or even a whole claw, is sometimes snapped off in these encounters. At certain seasons of the year these animals never meet each other without an engagement. In these, to come off with the loss of a leg, or even a claw, is considered as no great calamity; the victor carries off the spoil to feast upon at his leisure, while the other retires from the defeat to wait for a thorough repair. This repair is not long in procuring. From the place where the joint of the claw was cut away, is seen in a most surprising manner to burgeon out the beginning of a new claw.

This, if observed, at first, is small and tender, but grows, in the space of three weeks, to be almost as large and as powerful as the old one. I say almost as large, for it never arrives to the full size; and this is the reason we generally find the claws of the lobsters of unequal magnitude.

After what has been thus described, let us pause a little, to reflect on the wonders this extraordinary creature offers to our imagination! An animal without bones on the inside, yet furnished with a stomach capable of digesting the hardest substances, the shells of muscles, of oysters, and even its own; an animal gaining a new stomach and a new shell at stated intervals! Furnished with the instruments of generation double in both sexes; and yet with an apparent incapacity of uniting! Without red blood circulating through the body, and yet apparently vigorous and active! But most strange of all, an animal endowed with a vital principle that furnishes out such limbs as have been cut away; and keeps continually combating it, though in constant repair to renew its engagements!—These are but a small part of the wonders of the deep, where Nature sports without a spectator!

Of this extraordinary yet well-known animal there are many varieties, with some differences

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in the claws, but little in the habits or conformation. It is found above three feet long; and if we may admit the shrimp and the prawn into the class, though unfurnished with claws, it is seen not above an inch. These all live in the water, and can bear its absence for but a few hours. The shell is black when taken out of the water, but turns red by boiling. The most common way of taking the lobster is in a basket, or pot, as the fishermen call it, made of wicker-work, in which they put the bait, and then throw it to the bottom of the sea, in six or ten fathom water. The lobsters creep into this for the sake of the bait, but are not able to get out again. The river crawfish differs little from the lobster, but that the one will live only in fresh water, and the other will thrive only in the sea.

The crab is an animal found equally in fresh and salt water; as well upon land as in the ocean. In shape it differs very much from the lobster, but entirely resembles it in habits and conformation. The tail in this animal is not so apparent as in the former, being that broad flap that seems to cover a part of the belly, and when lifted discovers the peas or spawn, situated there in great abundance. It resembles the lobster in the number of its claws, which are two; and its legs, which are eight,

four on either side. Like the lobster, it is a bold voracious animal; and such an enmity do crabs bear each other, that those who carry them for sale to market, often tie their claws with strings to prevent their fighting and maiming themselves by the way. In short, it resembles the lobster in every thing but the amazing bulk of its body compared to the size of its head, and the length of its intestines which have many convolutions.

As the crab, however, is found upon land as well as in the water, the peculiarity of its situation produces a difference in its habits, which it is proper to describe. The Land Crab is found in some of the warmer regions of Europe, and in great abundance in all the tropical climates in Africa and America. They are of various kinds, and endued with various properties; some being healthful, delicious, and nourishing food; others, poisonous or malignant to the last degree; some are not above half an inch broad, others are found a foot over; some are of a dirty brown, and others beautifully mottled. That animal called the Violet Crab of the Caribbee Islands, is the most noted, both for its shape, the delicacy of its flesh, and the singularity of its manners.

The violet crab somewhat resembles two hands cut through the middle and joined to-

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gether; for each side looks like four fingers, and the two nippers or claws resemble the thumbs. All the rest of the body is covered with a shell as large as a man's hand and bunched in the middle, on the fore-part of which there are two long eyes of the size of a grain of barley, as transparent as crystal and as hard as horn. A little below these is the mouth, covered with a sort of barbs, under which there are two broad sharp teeth as white as snow. They are not placed, as in other animals, cross-ways, but in the opposite direction, not much unlike the blades of a pair of scissars. With these teeth they can easily cut leaves, fruits, and rotten wood, which is their usual food. But their principal instrument for cutting and seizing their food is their nippers, which catch such an hold, that the animal loses the limb sooner than its grasp, and is often seen scampering off, having left its claw still holding fast upon the enemy. The faithful claw seems to perform its duty, and keeps for above a minute fastened upon the finger while the crab is making off*. In fact it loses no great matter by leaving a leg or an arm, for they soon grow again, and the animal is found as perfect as before.

This, however, is the least surprising part of

* Brown's Jamaica, p. 423.

this creature's history : and what I am going to relate, were it not as well known and as confidently confirmed as any other circumstance in natural history, it might well stagger our belief. These animals live not only in a kind of orderly society in their retreats in the mountains, but regularly once a year march down to the sea-side in a body of some millions at a time. As they multiply in great numbers, they chuse the months of April or May to begin their expedition ; and then sally out by thousands from the stumps of hollow trees, from the clefts of rocks, and from the holes which they dig for themselves under the surface of the earth. At that time the whole ground is covered with this band of adventurers ; there is no setting down one's foot without treading upon them *. The sea is their place of destination, and to that they direct their march with right-lined precision. No geometrician could send them to their destined station by a shorter course ; they neither turn to the right or left, whatever obstacles intervene ; and even if they meet with a house, they will attempt to scale the walls to keep the unbroken tenor of their way. But though this be the general order of their route, they upon other occasions are compelled to conform to

* Labat. Voyage aux Isles Françaises, vol. ii. p. 21.

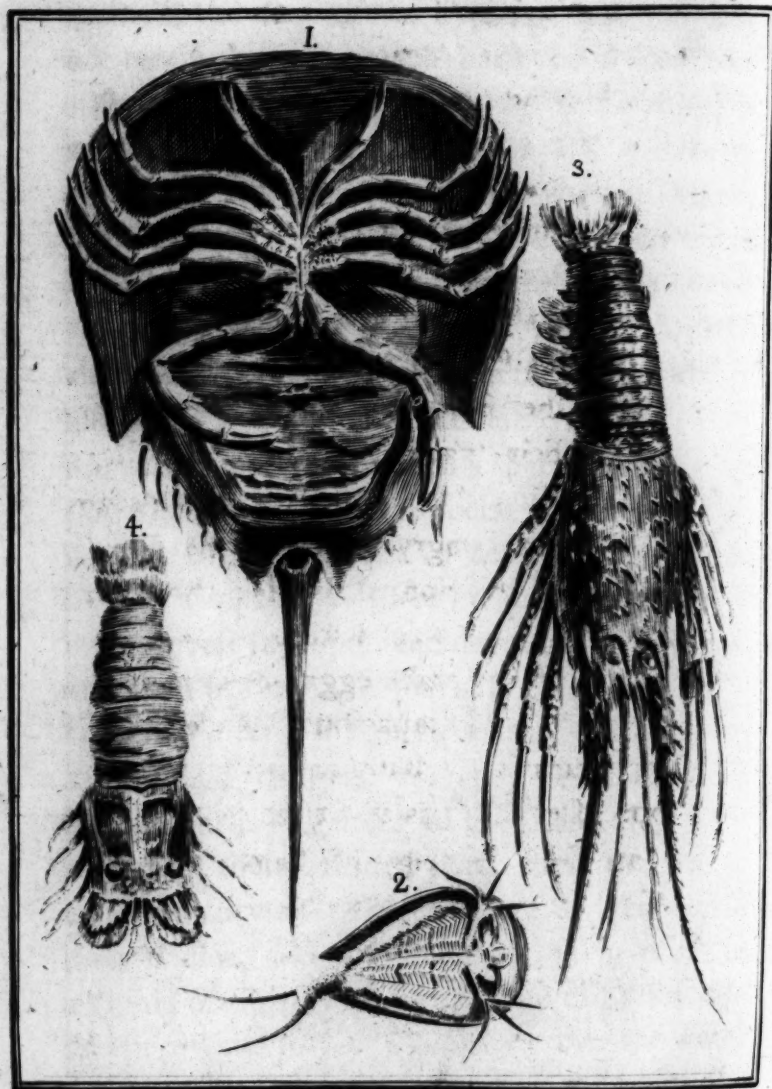
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the face of the country; and if it be intersected by rivers, they are then seen to wind along the course of the stream. The procession sets forward from the mountains with the regularity of an army under the guidance of an experienced commander. They are commonly divided into three battalions; of which, the first consists of the strongest and boldest males, that, like pioneers, march forward to clear the route and face the greatest dangers. These are often obliged to halt for want of rain, and go into the most convenient encampment till the weather changes. The main body of the army is composed of females, which never leave the mountains till the rain is set in for some time, and then descend in regular battalia, being formed into columns of fifty paces broad, and three miles deep, and so close that they almost cover the ground. Three or four days after this the rear-guard follows; a straggling undisciplined tribe, consisting of males and females, but neither so robust nor so numerous as the former. The night is their chief time of proceeding; but if it rains by day, they do not fail to profit by the occasion; and they continue to move forward in their slow uniform manner. When the sun shines and is hot upon the surface of the ground, they then make an universal halt, and

wait till the cool of the evening. When they are terrified, they march back in a confused disorderly manner, holding up their nippers, with which they sometimes tear off a piece of the skin, and then leave the weapon where they inflicted the wound. They even try to intimidate their enemies; for they often clatter their nippers together, as if it were to threaten those that come to disturb them. But though they thus strive to be formidable to man, they are much more so to each other; for they are possessed of one most unsocial property, which is, that if any of them by accident is maimed in such a manner as to be incapable of proceeding, the rest fall upon and devour it on the spot, and then pursue their journey.

When after a fatiguing march and escaping a thousand dangers, for they are sometimes three months in getting to the shore, they have arrived at their destined port, they prepare to cast their spawn. The peas are as yet within their bodies, and not excluded, as is usual in animals of this kind, under the tail; for the creature waits for the benefit of the sea-water to help the delivery. For this purpose, the crab has no sooner reached the shore, than it eagerly goes to the edge of the water, and lets the waves wash over its body two or three





1. The Violet Crab.
2. The River Crab.
3. The Sea Lobster.
4. The Lobster Crab.

E. Martin sculp.

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times. This seems only a preparation for bringing their spawn to maturity; for without farther delay they withdraw to seek a lodging upon land: in the mean time, the spawn grows larger, is excluded out of the body, and sticks to the barbs under the flap, or more properly the tail. This bunch is seen as big as an hen's egg, and exactly resembling the rows of herrings. In this state of pregnancy, they once more seek the shore for the last time, and shaking off their spawn into the water, leave accident to bring it to maturity. At this time whole shoals of hungry fish are at the shore in expectation of this annual supply; the sea to a great distance seems black with them; and about two thirds of the crabs eggs are immediately devoured by these rapacious invaders. The eggs that escape are hatched under the sand; and soon after millions at a time of these little crabs are seen quitting the shore, and slowly travelling up to the mountains.

The old ones, however, are not so active to return; they have become so feeble and lean, that they can hardly creep along, and the flesh at that time changes its colour. The most of them, therefore, are obliged to continue in the flat parts of the country till they recover, making holes in the earth, which they cover at the

mouth with leaves and dirt so that no air may enter. There they throw off their old shells, which they leave as it were quite whole, the place where they opened on the belly being unseen. At that time they are quite naked, and almost without motion for six days together, when they become so fat as to be delicious food. They have then under their stomachs four large white stones, which gradually decrease in proportion as the shell hardens, and when they come to perfection are not to be found. It is at that time that the animal is seen slowly making its way back; and all this is most commonly performed in the space of six weeks.

This animal when possessed of its retreats in the mountains is impregnable; for only subsisting upon vegetables, it seldom ventures out; and its habitation being in the most inaccessible places, it remains for a great part of the season in perfect security. It is only when impelled by the desire of bringing forth its young, and when compelled to descend into the flat country, that it is taken. At that time the natives wait for its descent in eager expectation, and destroy thousands; but disregarding the bodies, they only seek for that small spawn which lies on each side of the stomach within the shell, of about
the

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the thickness of a man's thumb. They are much more valuable upon their return after they have cast their shell; for being covered with a skin resembling soft parchment, almost every part except the stomach may be eaten. They are taken in their holes by feeling for them in the ground with an instrument: they are sought after by night, when on their journey, with flambeaux. The instant the animal perceives itself attacked, it throws itself on its back, and with its claws pinches most terribly whatever it happens to fasten on. But the dextrous crab-catcher takes them by the hinder legs in such a manner, that its nippers cannot touch him, and thus he throws it into his bag. Sometimes also they are caught when they take refuge at the bottom of holes, in rocks by the sea-side, by clapping a stick at the mouth of the hole, which prevents their getting out; and then soon after the tide coming, enters the hole, and the animal is found upon its retiring drowned in its retreat.

These crabs are of considerable advantage to the natives; and the slaves very often feed entirely upon them. In Jamaica, where they are found in great plenty, they are considered as one of the greatest delicacies of the place. Yet still, the eating of them is attended with

some danger; for even of this kind many are found poisonous, being fed, as it is thought, upon the machinel apple; and whenever they are found under that noxious plant, they are always rejected with caution. It is thus with almost all the productions of those luxurious climates; however tempting they may be to the appetite, they but too often are found destructive; and scarce a delicacy among them that does not carry its own alloy.

The descent of these creatures for such important purposes deserves our admiration; but there is an animal of the lobster kind that annually descends from its mountains in like manner, and for purposes still more important and various. Its descent is not only to produce an offspring, but to provide itself a covering; not only to secure a family, but to furnish an house. The animal I mean is the soldier-crab, which has some similitude to the lobster, if divested of its shell. It is usually about four inches long, has no shell behind, but is covered down to the tail with a rough skin, terminating in a point. It is however armed with strong hard nippers before, like the lobster; and one of them is as thick as a man's thumb, and pinches most powerfully. It is, as I said, without a shell to any part except its nippers; but what

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Nature has denied this animal it takes care to supply by art ; and taking possession of the deserted shell of some other animal, it resides in it, till, by growing too large for its habitation, it is under a necessity of change. It is a native of the West-India Islands ; and like the former, it is seen every year descending from the mountains to the sea-shore, to deposit its spawn, and to provide itself with a new shell. This is a most bustling time with it, having so many things to do ; and, in fact, very busy it appears. It is very probable that its first care is to provide for its offspring before it attends to its own wants ; and it is thought, from the number of little shells which it is seen examining, that it deposits its spawn in them, which thus is placed in perfect security till the time of exclusion.

However this be, the soldier is in the end by no means unmindful of itself. It is still seen in its old shell, which it appears to have considerably outgrown ; for a part of the naked body is seen at the mouth of it, which the habitation is too small to hide. A shell, therefore, is to be found large enough to cover the whole body : and yet not so large as to be unmanageable and unwieldy. To answer both these ends is no easy matter, nor the attainment of a slight

enquiry. The little soldier is seen busily parading the shore along that line of pebbles and shells that is formed by the extreme wave; still, however, dragging its old incommodious habitation at its tail, unwilling to part with one shell, even though a troublesome appendage, till it can find another more convenient. It is seen stopping at one shell, turning it and passing it by, going on to another, contemplating that for a while, and then slipping its tail from its old habitation, to try on the new. This also is found to be inconvenient; and it quickly returns to its old shell again. In this manner it frequently changes, till at last it finds one light, roomy and commodious; to this it adheres, though the shell be sometimes so large as to hide the body of the animal, claws and all*.

Yet it is not till after many trials, but many combats also, that the soldier is thus completely equipped; for there is often a contest between two of them for some well looking favourite shell for which they are rivals. They both endeavour to take possession; they strike with their claws; they bite each other, till the weakest is obliged to yield, by giving up the object of dispute. It is then that the victor immediately takes

* Pere du Testre.

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possession, and parades it in his new conquest three or four times back and forward upon the strand before his envious antagonist.

When this animal is taken, it sends forth a feeble cry, endeavouring to seize the enemy with its nippers; which if it fastens upon it will sooner die than quit the grasp. The wound is very painful, and not easily cured. For this reason, and as it is not much esteemed for its flesh, it is generally permitted to return to its old retreat to the mountains in safety. There it continues till the necessity of changing once more, and the desire of producing an offspring, expose it to fresh dangers the year ensuing.

B b 3

C H A P.

C H A P. III.

Of the Tortoise and its Kinds.

HAVING described the lobster and the crab as animals in some measure approaching to the insect tribes, it will appear like injustice to place the Tortoise among the number, that, from its strength, its docility, the warm red blood that is circulating in its veins, deserves to be ranked even above the fishes. But as this animal is covered, like the lobster, with a shell, as it is of an amphibious nature, and brings forth its young from the egg without hatching, we must be content to degrade it among animals that in every respect it infinitely surpasses.

Tortoises are usually divided into those that live upon land, and those that subsist in the water; and use has made a distinction even in the name; the one being called Tortoises, the other Turtles. However, Seba has proved that all tortoises are amphibious; that the land tortoise will live in the water; and that the sea turtle can be fed upon land. A land tortoise was brought to him that was caught in one of the canals of Amsterdam, which he kept for half a year in his house, where it lived very well

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contented in both elements. When in the water it remained with its head above the surface; when placed in the sun, it seemed delighted with its beams, and continued immoveable while it felt their warmth. The difference, therefore, in these animals, arises rather from their habits than their conformation; and, upon examination, there will be less variety found between them than between birds that live upon land, and those that swim upon the water.

Yet, though Nature seems to have made but few distinctions among these animals, as to their conformation, yet, in their habits, they are very dissimilar; as these result from the different qualities of their food, and the different sorts of enemies they have to avoid or encounter. I will therefore exhibit their figure and conformation under one common description, by which their slight differences will be more obvious; and then I will give a separate history of the manners of each, as naturalists and travellers have taught us.

All tortoises, in their external form, pretty much resemble each other; their outward covering being composed of two great shells, the one laid upon the other, and only touching at the edges: however, when we come to look closer, we shall find that the upper shell is com-

posed of no less than thirteen pieces, which are laid flat upon the ribs, like the tiles of an house, by which the shell is kept arched and supported. The shells both above and below that, which seem, to an inattentive observer, to make each but one piece, are bound together at the edges by very strong and hard ligaments, yet with some small share of motion. There are two holes at either edge of this vaulted body; one for a very small head, shoulders and arms, to peep through, the other at the opposite edge, for the feet and the tail. These shells the animal is never disengaged from; and they serve for its defence against every creature but man.

The tortoise has but a small head, with no teeth; having only two bony ridges in the place, serrated and hard. These serve to gather and grind its food; and such is the amazing strength of the jaws, that it is impossible to open them where they once have fastened. Even when the head is cut off, the jaws still keep their hold; and the muscles, in death, preserve a tenacious rigidity. Indeed, the animal is possessed of equal strength in all other parts of its body: the legs, though short, are inconceivably strong; and torpid as the tortoise may appear, it has been known to carry five men standing

upon its back, with apparent ease and unconcern. Its manner of going forward is by moving its legs one after the other; and the claws with which the toes are furnished, sink into the ground like the nails of an iron-shod wheel, and thus assist its progression.

With respect to its internal parts, not to enter into minute anatomical disquisitions, it may not be improper to observe, that the blood circulates in this animal as in some cartilaginous fishes, and something in the manner of a child in the womb. The greatest quantity of the blood passes directly from the vena cava into the left ventricle of the heart, which communicates with the right ventricle by an opening; while the auricles only receive what the ventricles seem incapable of admitting. Thus the blood is driven by a very short passage through the circulation; and the lungs seem to lend only occasional assistance. From this conformation the animal can subsist for some time, without using the lungs or breathing; at least, the lungs are not so necessary an instrument for driving on the circulation as with us.

Such is the general structure of this animal, whether found to live by land or water. With regard to the differences of these animals, the

land tortoise, from its habits of making use of its feet in walking, is much more nimble upon land than the sea turtle : the land tortoise, if thrown upon its back, by rocking and balancing its body, like a child rocking in a cradle, at last turns itself upon its face again ; but the turtle, when one turned, continues without being able to move from the spot. In comparing the feet also of these animals, the nails upon the toes of one that has been long used to scratch for subsistence upon land, are blunt and worn ; while those that have only been employed in swimming, are sharp and long, and have more the similitude of fins. The brain of the land tortoise is but small ; and yet it is three times as large as that of the turtle. There is a difference also in the shape of their eggs, and in the passage by which they are excluded ; for, in the land tortoise, the passage is so narrow, that the egg conforms to the shape of the aperture, and though round when in the body, yet becomes much more oblong than those of fowls, upon being excluded ; otherwise they would never be able to pass through the bony canal by which they are protruded : on the contrary, the passage is wider in the turtle, and therefore its eggs are round. These are the most striking distinctions ; but that which is

most known is their size ; the land tortoise often not exceeding three feet long, by two feet broad ; the sea turtle being sometimes from five to seven feet long. The size, however, is but a fallacious distinction ; since land tortoises, in some parts of India, grow to a very great magnitude ; though probably not, as the ancients affirm, big enough for a single shell to serve for the covering of an house.

But if the different kinds of tortoises are not sufficiently distinguished by their figure, they are very obviously distinguishable by their methods of living. The land tortoise lives in holes dug in the mountains, or near marshy lakes ; the sea turtle in cavities of rocks, and extensive pastures at the bottom of the sea. The tortoise makes use of its feet to walk with, and burrow in the ground ; the turtle chiefly uses its feet in swimming, or creeping at bottom.

The land tortoise is generally found, as was observed above, from one foot to five feet long, from the end of the snout to the end of the tail ; and from five inches to a foot and an half across the back. It has a small head, somewhat resembling that of a serpent ; an eye without the upper lid ; the under eye-lid serving to cover and keep that organ in safety. It has a strong, scaly tail, like the lizard. Its head the animal

can put out and hide at pleasure, under the great penth use of its shell: there it can remain secure from all attacks; there, defended on every side, it can fatigue the patience of the most formidable animal of the forest, that makes use only of natural strength to destroy it. As the tortoise lives wholly upon vegetable food, it never seeks the encounter; yet, if any of the smaller animals attempt to invade its repose, they are sure to suffer. The tortoise, impreguably defended, is furnished with such a strength of jaw, that, though armed only with bony plates instead of teeth, wherever it fastens, it infallibly keep its hold, until it has taken out the piece.

Though peaceable in itself, it is formed for war in another respect, for it seems almost endowed with immortality. Nothing can kill it; the depriving it of one of its members, is but a slight injury; it will live, though deprived of the brain; it will live, though deprived of its head. Redi informs us that, in making some experiments upon vital motion, he, in the beginning of the month of November, took a land tortoise made a large opening in its skull, and drew out all the brain, washed the cavity, so as not to leave the smallest part remaining, and then, leaving the hole open, set

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the animal at liberty. Notwithstanding this the tortoise marched away without seeming to have received the smallest injury; only it shut the eyes, and never opened them afterwards. Soon after the hole in the skull was seen to close; and, in three days, there was a complete skin covering the wound. In this manner the animal lived, without a brain, for six months; walking about unconcernedly, and moving its limbs as before. But the Italian philosopher, not satisfied with this experiment, carried it still farther; for he cut off the head, and the animal lived twenty-three days after its separation from the body. The head also continued to rattle the jaws, like a pair of castanets, for above a quarter of an hour.

Nor are these animals less long-lived than difficult in destroying. Tortoises are commonly known to exceed eighty years old; and there was one kept in the Archbishop of Canterbury's garden, at Lambeth, that was remembered above an hundred and twenty. It was at last killed by the severity of a frost, from which it had not sufficiently defended itself in its winter retreat, which was a heap of sand, at the bottom of the garden.

The usual food of the land tortoise seems not so nourishing as to supply this extraordinary prin-

ciple of vitality. It lives upon vegetables in its retreats in the mountains or the plain; and seldom makes its prey of snails or worms, but when other food is not found in grateful plenty. It is fond also of fruits; and when the forest affords them, is generally found not far from where they grow. As it can move but slowly, it is not very delicate in the choice of its food; so that it usually fills itself with whatever offers. Those that are kept in a domestic state, will eat any thing; leaves, fruits, corn bran, or grass.

From the smallness of its brain, and the slowness of its motion, it obviously appears to be a torpid, heavy animal, requiring rest and sleep; and, in fact, it retires to some cavern to sleep for the winter. I already observed that its blood circulated through the heart by a short passage; and that it did not, as anatomists express it, go through the great circulation. With us and quadrupedes the blood goes from the veins to the heart; from the heart it is sent to be spread over the lungs; from the lungs it returns to the heart again; and from thence it goes to the arteries, to be distributed through the whole body. But its passage in the tortoise is much shorter; for, from the veins it goes to the heart; then leaving the lungs entirely out of its course, it takes a short cut, if I may so

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say, into the beginning of the arteries, which send it round the animal frame. From hence we see the lungs are left out of the circulation; and consequently, the animal is capable of continuing to live without continuing to breathe. In this it resembles the bat, the serpent, the mole, and the lizard; like them it takes up its dark residence for the winter; and, at that time, when its food is no longer in plenty, it happily becomes insensible to the want. Nor is it unmindful to prepare its retreat, and make it as convenient as possible; it is sometimes buried two or three feet in the ground, with its hole furnished with moss, grass, and other substances, as well to keep the retreat warm, as to serve for food, in case it should prematurely wake from its state of stupefaction. But it must not be supposed that, while it is thus at rest, it totally discontinues to breathe; on the contrary, an animal of this kind, if put into a close vessel, without air, will soon be stifled; though not so readily as in a state of vigour and activity.

From this dormant state the tortoise is awakened by the genial return of spring; and is thought not to be much wasted by its long confinement. To animals that live an hundred and fifty years, a sleep of six months is but as

the nap of a night. All the actions of these long-lived creatures seem formed upon a scale answering the length of their existence : their slumber are for a season ; their motions are slow, and require time in every action : even the act of procreation, which among othe animals is performed in a very few minutes, is with them the business of days. About a month after their enlargement from a torpid state, they prepare to transmit their posterity ; and both continue joined, for near a month, together. The eggs of the female are contained in the ovary, above the bladder, which, is extremely large ; and these are, before their exclusion, round and naked, with spots of red : after they are laid, however, they assume another form, being smaller and longer than those of a hen. This alteration in the figure of the eggs most probably proceeds from the narrowness of the bony passage through which they are excluded. Swammerdam, who compared the size of the eggs taken out of this animal's body with the diameter of the passage through which they were excluded, was of opinion that the bones themselves separated from each other, and closed again ; but, in my opinion, it is more probable to suppose, that the eggs, and not the bones, alter their form. Certain it is, that they are round in the body, and that they are oval upon being protruded.

The

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The eggs of all the tortoise kind, like those of birds, are furnished with a yolk and a white; but the shell is different, being somewhat like those soft eggs that hens exclude before their time: however, this shell is much thicker and stronger, and is a longertime in coming to maturity in the womb. The land tortoise lays but a few in number, if compared to the sea turtle, who deposits from an hundred and fifty to two hundred in a season.

The amount of the land tortoise's eggs, I have not been able to learn; but, from the scarceness of the animal, I am apt to think they cannot be very numerous. When it prepares to lay, the female scratches a slight depression in the earth, generally in a warm situation, where the beams of the sun have their full effect: there depositing her eggs, and covering them with grass and leaves, she forsakes them, to be hatched by the heat of the season. The young tortoises are generally excluded in about twenty-six days; but, as the heat of the weather assists, or its coldness retards incubation, sometimes it happens that there is a difference of two or three days. The little animals no sooner leave the egg, than they seek for their provision, entirely self-taught; and their shell, with which they are covered from the be-

ginning, expands and grows larger with age. As it is composed of a variety of pieces, they are all capable of extension at their sutures, and the shell admits of encrease in every direction. It is otherwise with those animals, like the lobster, whose shell is composed all of one piece, that admits of no encrease; which, when the tenant is too big for the habitation, must burst the shell, and get another. But the covering of the tortoise grows larger in proportion as the internal parts expand; in some measure resembling the growth of the human skull, which is composed of a number of bones, encreasing in size in proportion to the quantity of the brain. All tortoises, therefore, as they never change their shell, must have it formed in pieces; and though, in some that have been described by painters or historians, these marks have not been attended to, yet we can have no doubt that they are general to the whole tribe.

It is common enough to take these animals into gardens, as they are thought to destroy insects and snails in great abundance. We are even told that, in hot countries, they are admitted into a domestic state, as they are great destroyers of bugs. How so large and heavy an animal is capable of being expert at such petty prey, is not easy to conceive; but I have

seen several of them about gentlemen's houses, that, in general, appear torpid, harmless, and even fond of employment. Children have sometimes got upon the back of a tortoise; and such was the creature's strength, that it never seemed overloaded, but moved off with its burthen to where it expected to be fed, but would carry them no further. In winter they regularly find out a place to sleep in; but in those warm countries in which the tortoise is found larger, and in greater plenty than in Europe, they live without retiring the whole year round.

The Sea Tortoise, or Turtle as it is now called, is generally found larger than the former. This element is possessed with the property of encreasing the magnitude of those animals, which are common to the land and the ocean. The sea pike is larger than that of fresh-water; the sea bear is larger than that of the mountains; and the sea turtle exceeds the land tortoise in the same proportion. It is of different magnitudes, according to its different kinds; some turtles being not above fifty pounds weight, and some above eight hundred.

The Great Mediterranean Turtle is the largest of the turtle kind with which we are acquainted. It is found from five to eight feet long, and from six to nine hundred pounds

weight. But, unluckily, its utility bears no proportion to its size; as it is unfit for food, and sometimes poison those who eat it. The shell also, which is a tough strong integument, resembling an hide, is unfit for all serviceable purposes. One of these animals was taken in the year 1729, at the mouth of the Loire, in nets that were not designed for so large a capture. This turtle, which was of enormous strength, by its own struggles involved itself in the nets in such a manner as to be incapable of doing mischief: yet, even thus shackled, it appeared terrible to the fishermen, who were at first for flying; but finding it impotent, they gathered courage to drag it on shore, where it made a most horrible bellowing; and when they began to knock it on the head with their gaffs, it was to be heard at half a mile's distance. They were still further intimidated by its nauseous and pestilential breath, which so powerfully affected them, that they were near fainting. This animal wanted but four inches of being eight feet long, and was above two feet over: its shell more resembled leather than the shell of a tortoise; and, unlike all other animals of this kind, it was furnished with teeth in each jaw, one rank behind another, like those of a shark: its feet also, different from the rest of this kind, wanted claws;

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and the tail was quite disengaged from the shell, and fifteen inches long, more resembling that of a quadrupede than a tortoise. This animal was then unknown upon the coasts of France; and was supposed to have been brought into the European seas, in some India ship, that might be wrecked upon her return. Since that, however, two or three of these animals have been taken upon the coasts; two in particular upon those of Cornwall, in the year 1756, the largest of which weighed eight hundred pounds; and one upon the Isle of Rhe, but two years before that, weighed between seven and eight hundred. One most probably of this kind also, was caught about thirty years ago near Scarborough, and a good deal of company was invited to feast upon it: a gentleman, who was one of the guests, told the company that it was a Mediterranean turtle, and not wholesome; but a person who was willing to satisfy his appetite at the risque of his life, eat of it: he was seized with a violent vomiting and purging; but his constitution overpowered the malignity of the poison.

These are a formidable and useless kind, if compared to the turtle caught in the South Seas and the Indian Ocean. These are of different kinds; not only unlike each other

in form, but furnishing man with very different advantages. They are usually distinguished by sailors into four kinds; the Trunk Turtle, the Loggerhead, the Hawksbill, and the Green Turtle.

The Trunk Turtle is commonly larger than the rest, and its back higher and rounder. The flesh of this is rank, and not very wholesome.

The Loggerhead is so called from the largeness of its head, which is much bigger in proportion than that of the other kinds. The flesh of this also is very rank, and not eaten but in case of necessity.

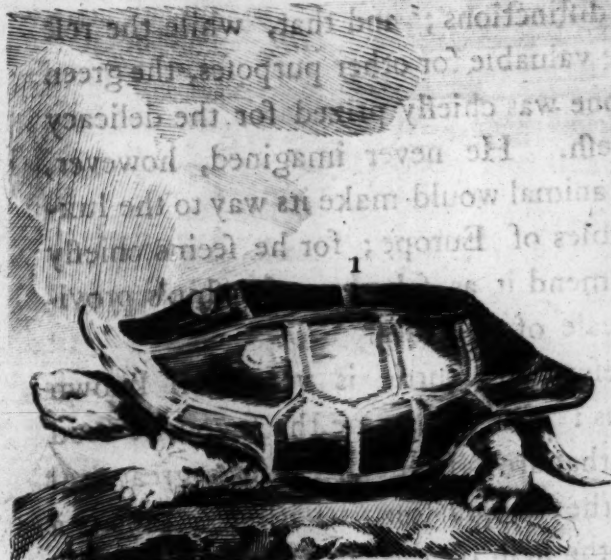
The Hawksbill Turtle is the least of the four, and has a long and small mouth, somewhat resembling the bill of an hawk. The flesh of this also is very indifferent eating; but the shell serves for the most valuable purposes. This is the animal that supplies the tortoise-shell, of which such a variety of beautiful trinkets are made. The substance of which the shells of other turtle are compose, is thin and porous; but that of the hawksbill is firm, and, when polished, is beautifully marbled. They generally carry about three pounds; but the largest of all six pounds. The shell consists, as in all the kind, of thirteen leaves or plates, of which eight are flat, and five hollow. They are raised and

taken off by means of fire, which is made under the shell after the flesh is taken out. As soon as the heat affects the leaves, they start from the ribs, and are easily raised with the point of a knife. By being scraped and polished on both sides, they become beautifully transparent; or are easily cast into what form the workman thinks proper, by making them soft and pliant in warm water, and then screwing them in a mold, like a medal; however, the shell is most beautiful before it undergoes this last operation.

But of all animals of the tortoise kind, the green turtle is the most noted, and the most valuable. The delicacy of its flesh, and its nutritive qualities, together with the property of being easily digested, were, for above a century, known only to our sea-men and the inhabitants of the coasts where they were taken. It was not till by slow degrees the distinction came to be made between such as were malignant and such as were wholesome. The controversies and contradictions of our old travellers were numerous upon this head; some asserting, that the turtle was delicious food; and others, that it was actual poison. Dampier, that rough sea-man, who has added more to natural history than half of the philosophers that went before him, appears to be the first who informed us

of their distinctions; and that, while the rest might be valuable for other purposes, the green turtle alone was chiefly prized for the delicacy of its flesh. He never imagined, however, that this animal would make its way to the luxurious tables of Europe; for he seems chiefly to recommend it as salted up for ship's provision, in case of necessity.

At present the turtle is very well known among us; and is become the favourite food of those that are desirous of eating a great deal without the danger of surfeiting. This is a property the flesh of the turtle seems peculiarly possessed of; and by the importation of it alive among us, gluttony is freed from one of its greatest restraints. The flesh of turtle is become a branch of commerce; and therefore ships are provided with conveniences for supplying them with water and provision, to bring them over in health from Jamaica and other West India islands. This, however, is not always effected; for though they are very vivacious, and scarce require any provision upon the voyage, yet, by the working of the ship and their beating against the sides of the boat that contains them, they become battered and lean; so that to eat this animal in the highest perfection, instead of bringing the turtle to



E. Martin sc.

2. The Sea Tortoise or Turtle. V.6.p.393.

1. The Land Tortoise. V.6.p.380.

the epicure, he ought to be transported to the
tortle.

This animal is called the green turtle, from
the colour of its shell, which is rather greener
than that of others of this kind. It is ge-
nerally found about a two hundred weight;
though some are five hundred, and others not
above fifty. Dampier tells us of one that was
seen at Port-Royal in Jamaica, that was in her
broad across the back; she does not seem to
other dimensions; but that the length of
Captain Roach, a boy about twelve years old, laid
in the shell, as in a boat. The throat is
father's ship, which was above a quarter of a
mile from land. Nothing to be seen
of some turtles. I took off a skin
affords us, that is, the inside of the
proboscis are much like with a single shell.
Diodorus Siculus tells us, that a good many
bought on Ethiopia, and that the Ethiopians
collected along the shore, and that in way when
per shell of this animal, and that in way when
they had eaten the flesh, the covering turned
them as a tent. In this account, Pliny, and all
the rest of the ancient writers, and as they had
frequent opportunities of knowing the truth, we
are not likely to contradict their testimony.
At present, however, they are not seen of



the epicure, he ought to be transported to the turtle.

This animal is called the green turtle, from the colour of its shell, which is rather greener than that of others of this kind. It is generally found about a two hundred weight; though some are five hundred, and others not above fifty. Dampier tells us of one that was seen at Port-Royal in Jamaica, that was six feet broad across the back: he does not tell us its other dimensions; but says, that the son of Captain Roach, a boy about ten years old, sailed in the shell, as in a boat, from the shore to his father's ship, which was above a quarter of a mile from land. But this is nothing to the size of some turtles the ancients speak of. *Ælian* assures us, that the houses in the Island of *Ta-probane* are usually covered with a single shell. *Diodorus Siculus* tells us, that a people neighbouring on *Ethiopia*, called the *Turtle-eaters*, coasted along the shore in boats made of the upper shell of this animal; and that in war, when they had eaten the flesh, the covering served them as a tent. In this account, *Pliny*, and all the rest of the ancients agree; and as they had frequent opportunities of knowing the truth, we are not lightly to contradict their testimony.

At present, however, they are not seen of

such amazing dimensions. We are told, by Laet, that on the Isle of Cuba they grow to such a size, as that five men can stand on the back of one of them together; and what is more surprising still, that the animal does not seem overloaded, but will go off with them upon its back, with a slow steady motion, towards the sea.

They are found in the greatest numbers on the Island of Ascension; where, for several years, they are taken to be salted to feed the slaves, or for a supply of ship's provision. Their value at present seems to be better known.

This animal seldom comes from the sea but to deposit its eggs, and now and then to sport in fresh-water. Its chief food is a submarine plant, that covers the bottom of several parts of the sea not far from the shore. There the turtles are seen, when the weather is fair, feeding in great numbers, like flocks of sheep, several fathoms deep upon the verdant carpet below. At other times they go to the mouths of rivers, and they seem to find gratification in fresh-water. After some time thus employed, they seek their former stations: and when done feeding, they generally float with their heads above water, unless they are alarmed by the approach of hunters or birds of prey, in which

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case they suddenly plunge to the bottom. They often seek their provision among the rocks, feeding upon moss and sea-weed; and it is probable will not disdain to prey upon insects and other small animals, as they are very fond of flesh when taken and fed for the table.

At the time of breeding, they are seen to forsake their former haunts and their food, and to take sometimes a voyage of nine hundred miles to deposit their eggs on some favourite shore. The coasts they always resort to upon these occasions are those that are low, flat, and sandy; for being heavy animals, they cannot climb a bold shore; nor is any bed so proper as sand to lay their eggs on. They couple in March, and continue united till May; during a great part of which time they are seen locked together, and almost incapable of separation. The female seems passive and reluctant; but the male grasps her with his claws in such a manner, that nothing can induce him to quit his hold. It would seem that the grasp, as in frogs, is in some measure convulsive, and that the animal is unable to relax its efforts.

When the time for laying approaches, the female is seen towards the setting of the sun drawing near the shore, and looking earnestly about her, as if afraid of being discovered.

When she perceives any person on shore, she seeks for another place: but if otherwise, she lands when it is dark, and goes to take a survey of the sand where she designs to lay. Having marked the spot, she goes back without laying, for that night, to the ocean again; but the next night returns to deposit a part of her burthen. She begins by working and digging in the sand with her fore-feet till she has made a round hole, a foot broad and a foot and an half deep, just at the place a little above where the water reaches highest. This done, she lays eighty or ninety eggs at a time, each as big as a hen's egg, and as round as a ball. She continues laying about the space of an hour; during which time, if a cart were driven over her, she would not be induced to stir. The eggs are covered with a tough white skin, like wetted parchment. When she has done laying, she covers the hole so dexterously, that it is no easy matter to find the place; and she must be accustomed to the search to make the discovery. When the turtle has done laying, she returns to the sea, and leaves her eggs to be hatched by the heat of the sun. At the end of fifteen days she lays about the same number of eggs again; and at the end of another fifteen days she repeats the same; three

times in all, using the same precautions every time for their safety.

In about twenty-four or twenty-five days after laying, the eggs are hatched by the heat of the sun; and the young turtles, being about as big as quails, are seen bursting from the sand, as if earth-born, and running directly to the sea, with instinct only for their guide: but, to their great misfortune, it often happens that, their strength being small, the surges of the sea, for some few days, beat them back upon the shore. Thus exposed, they remain a prey to thousands of birds that then haunt the coasts; and these stooping down upon them carry off the greatest part, and sometimes the whole brood, before they have strength sufficient to withstand the waves, or dive to the bottom. Helbigius informs us that they have still another enemy to fear, which is no other than the parent that produced them, that waits for their arrival at the edge of the deep, and devours as many as she can. This circumstance however demands further confirmation; though nothing is more certain than that the crocodile acts in the same unnatural manner.

When the turtles have done laying they then return to their accustomed places of feeding.

Upon their out-set to the shore, where they breed, they are always found fat and healthy; but upon their return, they are weak, lean, and unfit to be eaten. They are seldom therefore molested upon their retreat; but the great art is to seize them when arrived, or to intercept their arrival. In these uninhabited islands, to which the green turtle chiefly resorts, the men that go to take them land about night-fall, and without making any noise (for those animals, though without any external opening of the ear, hear very distinctly, there being an auditory conduit that opens into the mouth) lie close while they see the female turtle coming on shore. They let her proceed to her greatest distance from the sea; and then, when she is most busily employed in scratching a hole in the sand, they fall out and surprize her. Their manner is to turn her upon her back, which utterly incapacitates her from moving; and yet, as the creature is very strong and struggles very hard, two men find it no easy matter to lay her over. When thus secured they go to the next; and in this manner, in less than three hours, they have been known to turn forty or fifty turtles, each of which weighs from an hundred and fifty to two hundred pounds. Labat assures us that when

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the animal is in this helpless situation, it is heard to sigh very heavily, and even to shed tears.

At present, from the great appetite that man has discovered for this animal, they are not only thinned in their numbers, but are also grown much more shy. There are several other ways, therefore, contrived for taking them. One is, to seize them when coupled together, at the breeding season, when they are very easily approached, and as easily seen; for these animals, though capable of living for some time under water, yet rise every eight or ten minutes to breathe. As soon as they are thus perceived, two or three people draw near them in a canoe, and slip a nooze either round their necks or one of their feet. If they have no line, they lay hold of them by the neck, where they have no shell, with their hands only; and by this means they usually catch them both together. But sometimes the female escapes, being more shy than the male.

Another way of taking them is by the harpoon, either when they are playing on the surface of the water, or feeding on the bottom; when the harpoon is skilfully darted, it sticks fast in the shell of the back; the wood then disengages from the iron, and the line is long

enough for the animal to take its range; for if the harpooner should attempt at once to draw the animal into his boat till it is weakened by its own struggling, it would probably get free. Thus the turtle struggles hard to get loose, but all in vain; for they take care the line fastened to the harpoon shall be strong enough to hold it.

There is yet another way which, though seemingly awkward, is said to be attended with very great success. A good diver places himself at the head of the boat; and when the turtles are observed, which they sometimes are in great numbers, asleep on the surface, he immediately quits the vessel at about fifty yards distance, and keeping still under water, directs his passage to where the turtle was seen, and coming up beneath, seizes it by the tail; the animal awaking, struggles to get free; and by this both are kept at the surface until the boat arrives to take them in.

END OF THE SIXTH VOLUME.

